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# MINERALOGICAL ABSTRACTS


## VOLUME 14

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CONTENTS


| | Page |
|---|---|
| Foreword | ii |
| Index of authors | ii |
| Age determination and isotope mineralogy | 1 |
| Apparatus and techniques | 4 |
| Bibliographies | 12 |
| Book notices | 13 |
| Clay minerals | 14 |
| Crystal structure | 20 |
| Economic minerals and ore deposits | 26 |
| Experimental mineralogy | 35 |
| Gemstones | 39 |
| Geochemistry | 41 |
| History and biography | 45 |
| Meteorites and tektites | 45 |
| Mineral data | 50 |
| New minerals | 57 |
| Physical properties of minerals | 61 |
| Rock-forming minerals and petrology | 64 |
| Topographical mineralogy | 72 |
| Various | 74 |


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## FOREWORD

In 1876 when the *Mineralogical Magazine* started, short sections of selected abstracts were included, and fro 1894 these contributions by Dr. L. J. Spencer, A. Harker, and others, became more numerous and important. *T American Mineralogist*, from its beginning in 1916, regularly published reviews of new minerals. In 1920 the abstrac section of the *Magazine* was extended to a separately paged appendix which could be bound up separately ; from 508 page including the index, in volume 1, 1920–22, the abstracts expanded to 618 pages and an index of 100 pages more in volume 1 1953–55. Through this period the *Abstracts*, as well as the *Magazine*, were edited by Dr. Spencer, whose work in bringi the results of mineralogical research throughout the world to the notice of readers of English has been widely acknowledge In volume 13, 1956–58, edited by Dr. N. F. M. Henry, expansion continued.

Recent great increase in published research in mineralogy and allied provinces of science along both establishe and developing lines has caused a corresponding demand for early and concise notice of the results. Accordingly it wa agreed in 1958 by the Mineralogical Societies of Great Britain and America to co-operate in extending the *Abstracts* st further into a separate publication commencing as volume 14 in 1959. The enlarged *Abstracts*, of which the present the first number, is controlled by a Committee of management appointed by the sponsoring societies. Mineralogic and geological societies in other countries have agreed to supply abstracts, with mutual benefit to the publication an to their members. The work of the abstractors is done without recompense ; in making this known we wish to than them, on our readers' behalf as on our own, for their generous services.

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## INDEX OF AUTHORS


Abe, M., 43
Adams, S. L., 6
Adie, R. J., 74
Afanasiev, G. D., 2
Agrinier, H., 12
Åhman, E., 68
Aïdarov, T. K., 7
Albareda, J. M., 20
Aldrich, L. T., 1, 2
Aleixandre, V., 20
Alekseeva, K. N., 46
Alekseeva, O. M., 46
Aleksin, A. A., 44
Allen, L. R., 67
Allen, R. D., 56, 79
Allen, W. C., 39
Alver, E., 51
Amirkhanov, K. I., 2
Amphlett, C. B., 17
Andrews, A. I., 10
Anikin, I. N., 37
Anon., 34, 45
Antropov, P. Y., 33
Antun, P., 15
Appleman, D. E., 57
Armstrong, E. W., 27
Armstrong, F. C., 31
Avery, R. B., 12

Bailey, P. C., 22
Bak, M. A., 49
Bala, V. B., 22
Baldock, G. R., 62
Baranov, V. T., 11
Bari, R. E., 64
Bariand, P., 78
Barič, L. J., 77
Barnes, W. H., 24
Baron, G., 80
Barrabe, L., 76
Barrer, R. M., 21, 35
Barsanov, G. P., 25
Bartnitsky, E. N., 2
Bate, G. L., 1, 49
Battey, M. H., 52
Baur, G. S., 57
Baur, W. H., 23
Beck, C. W., 21
Becquerel, G., 11
Belov, N. V., 25
Benitez, F., 74
Benson, G. C., 62
Bernard, A., 9
Bertaut, F., 51
Beus, A. A., 44, 79
Birch, F., 38
Biswas, A. B., 23
Black, A. H., 4
Blackmon, P. D., 15
Blais, R. A., 30
Blazy, P., 9
Bloss, F. D., 64
Bloxam, T. W., 54
Bodenheimer, W., 7
Bonstedt-Kupletskaya, E. M., 57
Bordet, P., 68
Borodin, L. S., 70
Borodik-Romanova, T. F., 44
Bothwell, D. I., 54
Bown, M. G., 24
Brandt, S. B., 2
Brindley, G. W., 17, 25, 34
Brisi, C., 39
Brito, A. C. de, 76
Brown, D. A., 65
Brown, G., 16
Brown, G. M., 69
Brown, H., 48
Brown, L. G., 20
Brown, P. E., 71
Brunton, G., 21, 24
Buckenham, M. H., 34
Buckle, E. R., 35
Buddington, A. F., 72
Budko, I. A., 26
Bukina, A. N., 38
Bultitude, F. W., 21
Burov, A. P., 40
Buryanova, E. Z., 59
Buser, W., 35
Bushinsky, G. I., 25
Butler, J. R., 79

Cabell, M. J., 11
Caillère, S. M., 15, 73, 80
Calvert, L. D., 24
Cameron, E. L., 74
Cameron, E. N., 10
Canney, F. C., 8
Carlson, H. D., 74
Carpenter, G. B., 55
Carroll, D., 3
Carron, M. K., 37
Carstens, H., 65
Chalmers, R. A., 6
Champion, F. C., 64
Chayes, F., 10
Cheng, K. L., 6
Cheng, Shu-Hu, 5
Chodos, A., 48
Chu, Tzya-Syan, 65
Chynoweth, A. G., 61
Claringbull, G. F., 61
Clark, S. P., *Jr.*, 38
Clifford, T. N., 56
Coleman, R. G., 57
Collins, C. B., 1
Collomb, P., 76
Conant, M. L., 12
Connah, T. H., 29
Cormier, R. F., 4
Cornwall, H. R., 12
Coughlin, J. P., 63
Cousins, C. A., 29
Cowan, C. T., 17
Crowe, H. E., 7
Culkin, F., 6
Cumming, G. L., 1
Curtis, G. H., 4

Dave, A. S., 50
Davidson, C. F., 28, 58
Davis, F. F., 28
Davis, G. L., 1, 2
Deans, T., 54
Debras, J., 6
Degenhardt, H., 7
Degens, E. T., 42
Deicha, G., 36, 69, 76
de Jong, G. de J., 10
de Lange, P. W., 11
de Longuyon, I. G., 5
Dennen, W. H., 7, 8
Denning, R. M., 63
Dent, L. S., 21
Derge, G., 64
Dines, H. G., 28
Dixon, K., 8
Dodson, V. H., 4
Dolomanova, E. I., 57
Donn, B., 46
Donnay, G., 24
Donnay, J. D. H., 24
Dons, J. A., 73, 77
Dornberger-Schiff, K., 20
Droste, J. B., 19
Durand-Delga, M., 72
Dutra, C. V., 76
Dyakonova, M. I., 48, 49

Earp, J. R., 28
East, F., 9
Eckermann, H. v., 2, 71
Eliseev, E. N., 34
Engel, C. G., 43
Eppler, W. F., 41
Erlikh, E. N., 37


*Continued on p. iii*

Ernst, Th., 17
Eskova, E. M., 53
Evans, H. T., *Jr.*, 59
Everest, D. A., 12

Fahey, J. J., 43, 72
Fahn, R., 17
Fairbairn, H. W., 4
Farquhar, R. M., 1
Fassell, W. M., 80
Fauquier, D., 36
Faust, G. T., 43
Federico, M., 77
Feinstein, H. I., 6
Ferguson, R. B., 38
Fernandez, T., 20
Fezenkov, V. G., 45
Finlayson, D. M., 61
Fisher, D. J., 78
Flaschen, S. S., 38
Fockema, R. A. P., 31
Föëx, M., 36
Földvári-Vogl, M., 11
Forkel, W., 17
Forrat, F., 51
Foshag, W. F., 40
Foster, L. M., 36
Fowler, W. C., 7
Frank, F. C., 26
Frank-Kamenetsky, V. A., 26, 45
Frenzel, G., 50
Fuchs, L. H., 35, 36

Gabrielson, O., 21
Gagny, C., 75
Gainanova, E. I., 37
Gaines, R. V., 80
Garavelli, C. L., 58, 76, 77
Garaycochea, I., 10
Gard, J. A., 35, 60
Gasanov, S. A., 2
Gast, P. W., 8
Gay, P., 24
Gebert, E., 36
Geller, S., 22, 23
Getzeva, R. V., 58
Giletti, B. J., 1
Gilleo, M. A., 22, 23
Ginzburg, A. I., 32, 44
Ginzburg, I. I., 42
Ginzburg, I. V., 79
Gjelsvik, T., 31
Glacon, J., 29
Glagolev, A. A., 32
Glebov, R. I., 75
Gokhale, B. V., 63
Goodwin, J. G., 28
Gorbunova, L. I., 20
Gorovaya, B. S., 7
Gorzhevsky, D. I., 32
Goswami, N., 5
Gotman, Ya. D., 58, 59
Gottfried, D., 3
Gradwell, R., 9
Grazzini, M., 76
Greaney, T. P., 39
Green, G. W., 29
Greene-Kelly, R., 15
Gregg, S. J., 14
Gregoriev, Iv. F., 32, 57
Greig, D., 61
Grenier, P. E., 30
Grimshaw, R. W., 15
Grinshpan, L. B., 25
Grønvold, F., 22
Groves, A. W., 13
Grum-Grzhimailo, S. V., 40
Gruner, J. W., 23
Grütter, —., 35
Gübelin, E. J., 40
Guillemin, C., 51, 57
Gurvich, V. S., 2

Hagemann, F., 19
Hall, G. W., 29
Hamaguchi, H., 49
Handin, J., 63
Harker, R. I., 35
Harrison, F. W., 23
Harrison, R. K., 78
Harry, W. T., 66
Hartl, K., 77
Hartley, J., 72
Harvey, C. O., 9
Hathaway, J. C., 15
Hawkes, H. E., 41
Hayes, J. R., 5
Heier, K., 31, 65
Henderson, E. H., 6
Hénin, S., 14, 15
Henriques, Å., 22, 55, 63, 73
Herzog, L. F., 10
Hettler, A., 12
Hey, M. H., 54, 61
Higgs, D. V., 63
Hildebrand, F. A., 37
Hill, V. G., 21
Hill, W. H., 5
Hofmann, U., 15, 17, 77
Holdridge, D. A., 20
Holloway, H. L., 29
Hortsman, E. L., 6
Hosking, J. S., 16, 18
Hosking, K. F. G., 9, 78
Hriskevich, M. E., 79
Huang, W. T., 56
Huizenga, J. R., 49
Hunter, D. R., 70
Hurlbut, C. S., *Jr.*, 57
Hutton, C. O., 80
Hytönen, K., 60

Iordanov, N., 11
Isono, K., 7
Ivanov, A. A., 11
Ivanov, B. V., 37
Izáková, K., 4

Jackson, E. D., 9
Jackson, P. J., 5
Jaffe, H. W., 3
Jahns, R. H., 28
Jamieson, J. C., 80
Jamieson, R. T., 3
Jander, J., 40
Jeffries, C. D., 18
Jenkins, O. P., 27
Jennings, C. W., 12
Jérémine, E., 68
Joel, N., 10
Joklik, G. F., 65
Jones, H. N., 12
Jones, L. H. P., 60
Judel, G. K., 8
Jung, J., 13, 69

Kalinin, A. I., 48
Kalita, A. P., 53
Kao, Sheau-Shya, 5
Kato, I., 43
Kawai, N., 62
Kay, H. F., 22
Kazakova, M. E., 60
Keith, M. L., 42
Kern, R., 51
Kettner, R., 45
Khalifa-Zade, Ch. M., 58
Khapaev, I. A., 58
Khvostova, V. A., 53
Kilpady, S., 50
King, A. G., 78
King, E. C., 62
King, L. H., 12
King, R. R., 12
Kingsbury, A. W. G., 72, 73
Klar, G., 26
Klemens, P. G., 63
Klevtzov, P. V., 76
Klingsberg, C., 79
Koch, P., 68
Kocheva, L., 11
Koenig, J. B., 12
Kohn, J. A., 26
Komarov, A. G., 62
Komkov, A. I., 52, 59
Kondrashina, A. I., 9
Kononova, V. A., 70
Konta, I., 16
Kopchenova, E. V., 53
Kormilitzyn, V. S., 66
Kornetova, V. A., 53
Korst, W. L., 23
Korzhinsky, D. S., 71
Kostov, I., 34, 59
Kourimsky, J., 52
Kovalev, G. A., 59
Kramer, H., 6, 56
Kranck, E. H., 45
Krauskopf, K. B., 33, 44
Kraut, M. F., 73
Kreiter, V. M., 32
Krinov, E. L., 45, 49
Krutoyarsky, M. A., 67
Kullerud, G., 24
Kulp, J. L., 1, 4, 8
Kuryleva, N. A., 67
Kwascha, L. G., 48

Lagrange, R., 80
Lang, A. H., 1
Langston, R. B., 20
Lapham, D. M., 56
Lawrence, L. J., 78
Lebedev, A. P., 71
Lebedinsky, V. I., 65
Lehmann, H., 20
Leiper, H., 40
Lemmlein, G. G., 76
Lemmon, D. M., 56
Leonard, F. C., 47
Lerbekmo, J. F., 15
Levi, G. D., 50
Levin, B. Yu., 46, 47
Lewis, D. R., 63
Lindberg, M. L., 56
Lipscomb, W. N., 23
Lipson, J. I., 3, 49
Ljunggren, P., 77
Lohr, E., 12
Long, G., 36
Long, L. E., 4
Lott, P. F., 6
Lovering, J. F., 46, 47, 48
Lukin, L. I., 32
Lyman, J., 28
Lyons, J. B., 3

McAnulty, W. N., 69
McCune, S. E., 39
MacDonald, G. J. F., 38
MacDonald, S. G. G., 23
MacEwan, D. M. C., 16
Macgillavry, C. H., 23
Mackenzie, R. C., 14
MacKenzie, W. S., 10, 38
McKinlay, P. F., 30
McQuaig, J. A., 35
McTaggart, G. D., 10
Magakyan, I. G., 34
Maguire, S. G., 15
Manna, L., 6
Manuilova, M. M., 66
Marchandise, H., 33
Marfunin, A. S., 75
Marmo, V., 64
Martin, J. V., 12
Maslennikov, B. M., 8
Mason, B., 51, 67, 76
Massalskaya, K. P., 45
Mathias, M., 70
Mathieson, A. McL., 16
Maxwell, L. H., 64
Mayeda, T., 46
Medek, J., 7
Melankholin, N. M., 61
Mele, A., 46
Melkov, V. G., 58
Meyers, A. T., 8
Midgley, H. G., 54
Mikheev, V. I., 48
Miles, J. L., 22
Milne, A. A., 14, 60
Mitchell, B. D., 14
Mitchell, W. A., 14
Mitra, G. B., 63
Mitrofanova, K. V., 26
Molchanova, T. V., 70
Moleva, V. A., 37
Monier, J.-C., 51
Moor, G. G., 67
Moore, E. J. W., 23
Moore, F., 20
Morris, D. F. C., 42
Moss, A. A., 54
Moum, J., 18
Muan, A., 39
Muessig, S., 79
Murata, K. J., 43
Murray, K. L. H., 9
Myers, H., 10

Naeser, C. R., 37
Nagy, J., 35
Nakahira, M., 17, 25
Nambu, M., 78
Nedler, V. V., 8
Nelson, D. F., 78
Neuhaus, A., 37
Newman, R. B., 3
Newnham, R. E., 25

Nichiporuk, W., 48
Nicholls, G. D., 41, 62
Nicolaysen, L. O., 1
Norrish, K., 61

O'Brien, C. J., 63
Oftedahl, C., 71
Oftedal, I., 42
Ong, J. N., 80
Onishi, H., 49
Orcel, J., 36
Osborn, E. F., 38
Osborne, F. F., 69
Ostrom, M. E., 42
Oughton, B. M., 21
Ovchinnikov, L. N., 2
Owers, M. J., 6
Ozerov, R. P., 25

Pabst, A., 10
Pallister, J. W., 29
Panova, M. V., 2
Park, C. F., *Jr.*, 33
Parker, C. J., 15
Parker, T. W., 14
Pask, J. A., 20
Paton, F., 23
Patterson, C. C., 1
Patterson, E. M., 43
Pavlov, N. V., 52
Pavlov, P. V., 25
Payne, C. J., 39, 61
Pepper, J. E., 28
Perey, M., 12
Permingeat, F., 57, 64
Perrault, G., 75
Petrov, R. P., 32
Petrova, E. S., 60
Petrzhak, K. A., 49
Phelps, G. W., 15
Pierrot, R., 51
Pieruccini, R., 33
Pinson, W. H., *Jr.*, 4, 10
Plafker, G., 9
Plas, H. J. van der, 23
Pobeguin, T., 80
Potratz, H. A., 49
Pratt, E. M., 12
Preusse, H.-U., 19
Protich, M., 29, 67
Puchelt, H., 50
Pudovkina, I. A., 13
Pukhalsky, L. C., 58

Quinn, A. W., 3

Rafols Rovira, J. M., 4
Raguin, E., 33
Ramdohr, P., 33
Rath, R., 50
Raudonis, P. A., 38
Reed, G. W., 49
Reed, J. J., 67
Reichen, L. E., 56
Rérolle, E., 27
Reynolds, J. H., 4, 49
Richartz, W., 37
Richter, D. H., 56
Riley, J. P., 5, 6, 7
Rimskaya-Korsakova, O. M., 49
Rimsky, A., 51
Rinehart, J. S., 46
Ringwood, A. E., 37, 39
Robertson, E. C., 38
Robertson, R. H. S., 16
Robichet, O., 14
Robinson, S. C., 1
Rogers, J., 34
Rogers, J. J. W., 66
Rogers, L. E. R., 61
Rolfe, B. N., 18
Romanova, E. M., 34
Romanova, L. V., 8
Roques, M., 74
Rose, H. J., *Jr.*, 37
Rosenblum, S., 9
Rosenqvist, I. Th., 18, 19
Ross, D. C., 9
Rossetti, V., 50
Røst, E., 22
Roubault, M., 9
Rowland, G. L., 47
Roy, R., 79
Roy, S. K., 47
Rumanova, I. M., 26
Rusanov, A. K., 9
Russell, R. D., 1, 2

Sabatier, G., 63
Safiannikoff, A., 52
Sahama, Th. G., 21, 60, 65
Saldau, E. P., 26
Salmon, L., 11
Sampson, E., 79
Samson, H. R., 17
Sand, L. B., 57
Sandell, E. B., 49
Sandréa, A., 68
Sanjana, N. R., 23
Satava, J., 52
Savelieva, K. T., 58
Šćavničar, S., 35
Scharrer, K., 8
Schilling, J. H., 30
Schlegel, D. M., 40
Schmidt, R. G., 66
Schofield, R. K., 17
Schreiner, G. D. L., 3
Schüller, A., 57
Schultz, L. G., 19
Scott, G. R., 80
Seeman, H., 40
Sellevoll, M. A., 51
Semenyushkin, I. N., 49
Senderova, V. M., 5
Shabaeva, E. A., 20
Shallcross, F. V., 55
Shapter, R. E., 61
Sharp, R. P., 43
Shats, M. M., 49
Shaw, D. M., 7, 41, 42, 51
Sheina, Z. G., 11
Shelton, J. E., 34
Shelton, J. S., 66
Sherwood, A. M., 59
Shibanov, P. N., 75
Shillibeer, H. A., 2
Shirozo, H., 50
Shishkin, N. N., 53
Shur, A. S., 2
Simon, I., 20
Simons, F. S., 31
Sindeeva, N. D., 32
Sinha, A. P. B., 21, 23
Sinha, K. P., 21
Sinhaseni, P., 7
Sitzia, R., 50
Skinner, B. J., 62
Skvortzova, K. V., 53
Slawson, C. B., 64
Slonimsky, G. L., 47
Smales, A. A., 11, 43
Smirnova, S. I., 34
Smith, D. K., *Jr.*, 23
Smith, F. G., 21
Smith, J. V., 21, 54
Smith, W. C., 47
Smith, W. D., 27
Smith, W. L., 3
Snow, R. B., 39
Sobolev, V. S., 40, 62
Soboleva, M. V., 13
Sobotovich, E. V., 2
Solodovnik, S. M., 9
Sosedko, A. F., 44, 52
Soutchitch, Z., 67
Spejidnaes, N., 19
Spencer, L. J., 47, 57
Spurr, R. A., 10
Stanton, M. S., 74
Staples, L. W., 55
Starik, I. E., 2, 49
Steele, T. W., 11
Steiner, A., 18
Steinfink, H., 21, 24, 25
Stephens, M. J., 14
Stern, T. W., 59
Stewart, R. M., 27
Stickney, W. A., 34
Stieff, L. R., 59
Stoll, W. C., 30, 31
Straczek, J. A., 31
Straley, H. W., *III*, 27
Strand, R. G., 12
Strunk, D. H., 6
Strunz, H., 24
Stumpf, H. C., 36
Sudo, T., 18
Sugaki, A., 36
Suhr, N., 55
Sumin, N. G., 79
Sutherland, J. W., 21
Sutton, W. H., 34
Swaine, D. J., 43
Swift, W. H., 73
Symons, H. H., 28

Tai, Shu-Kuei, 5
Takéuchi, T., 36, 78
Tanton, T. L., 74
Tarjan, I., 35
Tashiro, C., 36
Tatarsky, N. B., 45
Taylor, H. F. W., 21, 35, 60
Taylor, K., 78
Tharin, J. C., 19
Thilo, E., 40
Thomasson, E. M., 28
Thompson, C. S., 75
Thompson, R. M., 51
Thoreau, J., 52, 59
Tieubergenova, G., 11
Tikhonenkov, I. P., 60
Tilley, C. E., 41
Tilton, G. R., 1, 2
Toll, R. W., 28
Toulmin, P., *III*, 66
Tovell, W. M., 74
Trask, P. D., 20
Trumbull, J., 28
Tucker, B. M., 5
Turekian, K. K., 8
Turkevich, A., 49
Tuttle, O. F., 35, 54
Twedily, A. E., 16

Ueda, Y., 43
Umova, M. A., 75
Urey, H. C., 46, 47
Usher, J. L., 31

Vakhrushev, V. A., 70
Valeška, F., 7
van Tassel, R., 78
van Zeggeren, F., 62
Vardanyantz, L. A., 75
ver Planck, W. E., 27, 28
Vlasov, K. A., 32
Vlassov, K. A., 43
Vlisidis, A., 72
Voinovitch, I. A., 5, 6
Volfson, F. I., 32
von Gehlen, K., 17

Wachtman, J. B., *Jr.*, 64
Wadsworth, M. E., 75, 80
Walker, T. R., 75
Wallraf, M., 5
Ward, F. N., 7, 8
Warden, A. J., 29
Waring, C. L., 3
Wasserburg, G. J., 39
Watanabe, M., 27
Watts, H. L., 4
Webb, M. S. W., 6
Wedepohl, K. H., 42
Wedepohl, P. T., 61
Weiss, A., 17, 77
Weissenborn, H. F., 12
Welin, E., 23
Wenden, H. E., 61
Wetherill, G. W., 2
Weyl, P. K., 63
Wheeler, E. P., *II*, 69
White, C. C., 34
White, D., 17
White, D. E., 44
Whitehead, W. L., 12
Wickman, F. E., 2, 50
Wiles, J. W., 73
Williams, E. G., 42
Wilson, J. T., 1
Wolszon, J. D., 5
Wood, E. A., 22
Wood, J. A., *Jr.*, 44
Worst, B. G., 73
Wyart, J., 35, 36

Yakhontova, L. K., 38
Yavnel, A. A., 46, 47, 48
Yokoyama, K., 55
Yoshimura, T., 27, 50
Yudin, I. A., 48

Zemann, A., 23
Zemann, J., 23, 25
Zhak, L., 45

# MINERALOGICAL ABSTRACTS

Vol. 14—No. 1 March 1959

## AGE DETERMINATION AND ISOTOPE MINERALOGY

**Collins (C. B.), Lang (A. H.), Robinson (S. C.), & Farquhar (R. M.).** *Age determinations for some uranium deposits in the Canadian Shield.* Proc. Geol. Assoc. Canada, 1952, **5**, 15–41.

Fifty-two new lead isotope age determinations from localities in the Canadian Shield are cited. The paper is divided into two parts, the first describing the methods and results; the second dealing with the geological and mineralogical background and implications of the results for each area studied. The range of ages determined from samples of pitchblende within an area is attributed to partial dissolution and redeposition after the original precipitation; the oldest age determined thus sets a useful younger limit to the age of the host rock. In the Goldfields region, polished section evidence and the occurrence of radiogenic lead in galena associated with samples for which a relatively younger age is determined, support the conclusion that in some uranium deposits partial dissolution and redeposition has occurred. W. E. H.

**Aldrich (L. T.), Tilton (G. R.), Davis (G. L.), Nicolaysen (L. O.), & Patterson (C. C.).** *Comparison of U-Pb, Pb-Pb, and Rb-Sr ages of Precambrian minerals.* Proc. Geol. Assoc. Canada, 1955, **7**, 7–13, 1 fig.

Age determinations and analytical data on five Precambrian granites are tabulated according to the methods employed; $^{238}U/^{206}Pb$, $^{235}U/^{207}Pb$, $^{207}Pb/^{206}Pb$, Rb/Sr. Results of four Rb/Sr age determinations on Precambrian pegmatites are also presented. Comparatively high age values for the Rb/Sr method may be due to: (a) incorrect decay constant for $^{87}Rb$, (b) the loss of Rb by replacement. Disagreement between U/Pb and Pb/Pb ages may result from radon leakage, loss of lead, additions in uranium, and errors in corrections for primary lead. The data obtained are not sufficient to allow comparison of the relative merits of the methods used. W. E. H.

**Kulp (J. Laurence), Bate (George L.), & Giletti (Bruno J.).** *New age determinations by the lead method.* Proc. Geol. Assoc. Canada, 1955, **7**, 15–24, 5 tables.

Ages of a number of radioactive minerals have been determined from $^{207}Pb/^{206}Pb$, $^{206}Pb/^{238}U$, $^{207}Pb/^{235}U$ and $^{206}Pb/^{210}Pb$ ratios. Values obtained for minerals from classic localities agree well with those reported by other investigators. Major attention has been given to the anomalies of the ages of a given mineral computed from the various possible isotope ratios. The development of the $^{210}Pb$ method adds greatly to the fund of data required to obtain accurate ages. The 206/210 age is essentially independent of uranium leaching or radon leakage. The latter is a significant factor in 206/238 and 207/206 ratios and must be measured experimentally to evaluate ages from these ratios. It appears that throughout most of the span of geologic time the 207/235 and 206/210 ages are the most reliable if lead loss has not occurred. The 206/238 supersedes the 207/235 age in accuracy for very young minerals. For young minerals the 207/206 age does not merit the reliability ascribed to it by earlier investigators. (Authors' abstract.) W. E. H.

**Cumming (G. L.), Wilson (J. T.), Farquhar (R. M.), & Russell (R. D.).** *Some dates and subdivisions of the Canadian Shield.* Proc. Geol. Assoc. Canada, 1955, **7**, 27–29.

A review of more than 300 age determinations on Canadian minerals provides a basis for establishing broad Precambrian tectonic units. The limitations of each method of age determination are considered. Nine tectonic divisions are tentatively defined extending from a maximum of 2400 million years to 800 million years. Geographic analysis of results conforms with the hypothesis of continental growth by successive accretion along margins of ancient nuclei. W. E. H.

**Eckermann** (**H. v.**) & **Wickman** (**F. E.**). *A preliminary determination of the maximum age of the Alnö rocks.* Geol. Fören. Förh. Stockholm, 1956, **78**, 122–124.

In pyrochlore from a sövite rock taken at Smedsgarden, Alnö, the uranium, thorium, and lead content has been determined: Pb 0·0405%, U 0·026%, Th 1·51%. From these values an apparent age of 562 m.y. has been calculated. The authors point out that this value is to be taken as a maximum age until the lead isotope ratio has been determined. E. W.

**Shillibeer** (**H. A.**) & **Russell** (**R. D.**). *The argon-40 content of the atmosphere and the age of the earth.* Geochim. et Cosmochim. Acta, 1955, **8**, 16–21.

If it is assumed that radiogenic argon ($^{40}$A) is released from crustal rocks during the formation of the continents then 5300 m.y. would be needed to produce the mass of present-day atmospheric $^{40}$A taking the branching ratio $\lambda_\kappa/\lambda_\beta$ as ·089. (4800 m.y. would be needed if the branching ratio is taken as ·125). The assumed mode of formation of atmospheric $^{40}$A is plausible in that an age for the earth of 5300 m.y. is in reasonable agreement with other estimates of the age of the earth and universe. The present mass of $^{40}$K in all continental rocks and the ocean floor above the Mohorovičić discontinuity is estimated as $4{\cdot}967 \times 10^{19}$ g. J. R. B.

[**Afanasiev** (**G. D.**)] Афанасьев (Г. Д.). О кайнозойском магматизме Кавказа и о некоторых итогах определения абсолютного возраста кавказских пород K–Ar методом. [*On Kainozoic magmatism of the Caucasus and on some results of absolute age determination of Caucasian rocks by the K–A method.*] Изв. Акад. Наук СССР, Сер. Геол. [Bull. Acad. Sci. URSS, Sér. Géol.], 1957, no. **6**, 30–54, 18 figs.

The age of Caucasian intrusive rocks is discussed and data relating to age determination by the K–A method are given. The divergence in ages of minerals on the same rock is explained as being due either to the different ages of formation of these minerals or to later thermal metamorphic influences. S. I. T.

[**Starik** (**I. E.**) & **Sobotovich** (**E. V.**)] Старик (И. Е.) и Соботович (Э. В.). Свинец в природных образованиях и его изотопный состав. [*Lead in natural formations and its isotopic composition.*] Изв. Акад. Наук СССР, Сер. Геол. [Bull. Acad. Sci. URSS, Sér. Géol.], 1957, no. **9**, 81–85, 1 fig.

Sublimation fractions of lead from the Joachimsth pitchblende and two granites from the U.S.S.R. were sub jected to isotopic analysis. The results have shown tha with increasing temperature of sublimation the sampl are enriched in radiogenic lead and that leads from differe rocks show different isotopic composition. The latter fa may be applied to the study of the manner of occurren of lead as well as for the determination of its age. S. I. T.

[**Ovchinnikov** (**L. N.**), **Shur** (**A. S.**), & **Panova** (**M. V.**)] Овчинников (Л. Н.), Шур (А. С.) и Панова (М. В. Об абсолютном возрасте некоторых изверженны метаморфических и осадочных образований Урал [*The absolute age of some igneous, metamorphic, an sedimentary formations of the Urals.*] Изв. Акад. Нау СССР, Сер. Геол. [Bull. Acad. Sci. URSS, Sé Géol.], 1957, no. **10**, 3–14, 1 fig.

The validity of the constant of K–capture proposed b E. K. Gerling was established through comparison of a determination of Uralian rocks by the argon method and b the palaeontological method. The oldest Uralian obje was a feldspar fragment from a Proterozoic arkose 2140 m.y. Precambrian gneiss gave 1090 m.y., pluton rocks of Caledonian age 337–358 m.y., those of Hercynia age 226–302 m.y., liparite lavas of Triassic age 164 m. Numerous data also include metamorphic and sedimenta rocks and various ores. S. I. T.

[**Amirkhanov** (**K. I.**), **Brandt** (**S. B.**), **Bartnitzky** (**E. N**) **Gurvich** (**V. S.**), & **Gasanov** (**S. A.**)] Амирханов (Х. И Брандт (С. Б.), Бартницкий (Е. Н.), Гурвич (В. С.) Гасанов (С. А.). К вопросу о сохранности радиогенно аргона в глауконитах. [*On the preservation of radiogen argon in glauconites*]. Доклады Акад. Наук СС [C.R. Acad. Sci. URSS], 1958, **118**, 328–330, 2 figs.

About twenty per cent. of radiogenic argon contained glauconites is lost at 100°C and the whole at 500°C. Bo argon and potassium are weakly bound in the lattice glauconite. S. I. T.

**Tilton** (**G. R.**), **Davis** (**G. L.**), **Wetherill** (**G. W.**), & **Aldri** (**L. T.**). *Isotopic ages of zircon from granites a pegmatites.* Trans. Amer. Geophys. Union, 19 **38**, 360–371.

Isotopic lead age determinations have been made thirteen zircons from rocks 185 to 1400 m.y. old. C cordant or nearly concordant ages are found for all of t

amples which contain no detectable common lead, and discordant ages are found for most, if not all, of the samples which do contain it. When a discordant age result is compared with the K/A and Rb/Sr ages of associated mica the $^{207}Pb/^{206}Pb$ age is found to be the closest to the mica age. The discordant age results for zircons are related to more recent orogenies. [M.A. **13**–500] R. A. H.

**Jamieson (R. T.) & Schreiner (G. D. L.).** *The ages of some African lepidolites determined from the $^{87}Rb$–$^{87}Sr$ decay.* Proc. Roy. Soc. London, 1957, **146**, B, 257–269, 4 figs.

Using isotope dilution the ages of fourteen lepidolites from eight African localities have been determined. For three localities series of statistical experiments were carried out; the ages and 95% confidence limits for the mean of the determinations are: Pope's Claim, Southern Rhodesia, 'A' 2931±63 m.y., 'B' 2955±75 m.y.; Bikita, Southern Rhodesia, 'A' 2978±43 m.y., 'B' 2961±25 m.y. Alto Ligonha, Portuguese East Africa, 'A' 533±8·3 m.y., 'B' 528±8·5 m.y. The Karibib area, South-West Africa, is dated from three separate samples as 600±70 m.y. Other ages determined are Hombolo, Tanganyika, 2990±200 m.y.; Antelope Mine, Southern Rhodesia, 2675±150 m.y. Tsarafara, Madagascar, 652±45 m.y. and Mica Siding, North-east Transvaal, 2040±150 m.y. The relationship of these ages to ages determined using the $^{87}Rb/^{87}Sr$ decay elsewhere and to U/Pb ages for the same areas is discussed, and it is shown that for the Rhodesian shield a value for the decay constant of $\lambda = 1{\cdot}26 \pm 0{\cdot}04 \times 10^{-11}$ for $^{87}Rb$ decay would lead to agreement with the U/Pb ages. [M.A. **10**–373; **12**–438, 584] R. A. H.

**Quinn (Alonzo W.), Jaffe (Howard W.), Smith (W. L.), & Waring (C. L.).** *Lead-alpha ages of Rhode Island granitic rocks compared to their geological ages.* Amer. Journ. Sci., 1957, **255**, 547–560.

The three groups of granitic rocks in Rhode Island have been dated by lead-alpha determinations on zircon and monazite. The Scituate granite gneiss and the Esmond granite gave mean ages of 306±18 m.y., the Cowesett and Quincy granites gave 270±7 m.y.; and the Westerly and Narragansett Pier granites gave 234±23 m.y. These ages are consistent with the geological evidence and within the accepted age limits for the Devonian, Mississippian, and Pennsylvanian periods respectively. R. A. H.

**Lyons (J. B.), Jaffe (H. W.), Gottfried (D.), & Waring (C. L.).** *Lead-alpha ages of some New Hampshire granites.* Amer. Journ. Sci., 1957, **255**, 527–546.

Age determinations from certain accessory minerals by the Larsen method [M.A. **12**–276] are reported for five Palaeozoic plutonic series from New Hampshire, and for granites of Middle Devonian age from Maine and New Brunswick. Most of the determinations were done on zircons, but monazite and xenotime were also used. The results, for the most part, agree with the geology. R. A. H.

**Carroll (Dorothy), Newman (R. B.), & Jaffe (H. W.).** *Heavy minerals in arenaceous beds in parts of the Ocoee Series, Great Smoky Mountains, Tennessee.* Amer. Journ. Sci., 1957, **255**, 175–193.

Soft and weathered low grade metamorphic psammitic rocks of western Tennessee (saprolites) contain a restricted suite of heavy minerals dominated by ilmenite and zircon: comparison with the fresh rock shows that apatite has been removed, magnetite has suffered oxidation and hydration, and ilmenite has been altered. The three varieties of zircon in the heavy residues were well rounded, fresh, purple zircon or hyacinth, an angular or subangular metamict type, and a subangular to rounded clear colourless type. Age determinations for these three varieties by the total lead-alpha method of Larsen [M.A. **12**–276] gave values of 1140 m.y. for fresh purple rounded grains, 620 m.y. for fresh purple elongated grains, and varying ages between 740 and 890 m.y. for metamict and colourless samples. [M.A. **2**–311, **3**–503, **11**–209, **13**–296] R. A. H.

**Lipson (Joseph).** *Potassium-argon dating of sedimentary rocks.* Bull. Geol. Soc. America, 1958, **69**, 137–150, 7 figs.

Geologically well-dated authigenic sediments ranging from Miocene to Devonian in age have been analysed with equipment designed to date small samples of materials of low radiogenic argon content. The procedures and the equipment are described in detail. Age determinations of seven glauconite samples from the Oligocene, Eocene, and Paleocene of New Zealand are consistent with the stratigraphy and correspond to previous U–Pb and K–A dates for that part of the time scale. Ages of three Miocene glauconite samples from the same sequence are anomalously high compared to those of the Oligocene samples. The age

for a Cretaceous glauconite from Canada is high compared to that of other samples, while the ages for a Cretaceous feldspar and a Devonian sylvine, both from Canada, are consistent with the Holmes B time scale. Several possible explanations are given for the discrepancies. A. L. A.

**Curtis (G. H.) & Reynolds (J. H.).** *Notes on the potassium-argon dating of sedimentary rocks.* Bull. Geol. Soc. America, 1958, **69**, 151–160.

Limitations in the present geological time scale are considered, and it is predicted that the ultimate geological time chart will be based for the most part on dates for minerals from extrusive igneous rocks and sedimentary rocks rather than for minerals from plutonic rocks and veins. To be useful for K–A dating sedimentary minerals must contain potassium and must have crystallized entirely in the sedimentary environment of the sedimentary rock, have grown essentially at the water–sediment interface, and have retained most of their radiogenic argon. Sylvine and glauconite appear to meet these requirements. The methods used to prepare glauconite for analysis are described. Possible errors due to contamination, argon inheritance, and argon loss by diffusion are discussed. A. L. A.

**Pinson (W. H., *Jr*), Fairbairn (H. W.), & Cormier (R. F.** *Sr/Rb age measurements on hornblende and feldspar an the age of syenite at Chicoutimi, Quebec, Canada.* Bul Geol. Soc. America, 1958, **69**, 599–602.

Separate Sr isotope-ratio analyses were made for c existing hornblende and feldspar, and ages were calculate from both the isotope-dilution (I.D.) and the isotope-rat (I.R.) data. The hornblende gave ages of 1020±100 m.y (I.D.) and 950±50 m.y. (I.R.); the feldspar gave ages 600±300 m.y. (I.D.) and 840±40 m.y. (I.R.). A. L. A.

**Long (Leon E.) & Kulp (J. Laurence).** *Age of the met morphism of the rocks of the Manhattan Prong.* Bul Geol. Soc. America, 1958, **69**, 603–606, 1 fig.

Potassium–argon ages on 10 samples of biotite, phlog pite, and muscovite from different rock units and locatio in the Manhattan Prong, New York, are reported. Agre ment among eight of the samples suggests an averag apparent age of 360±9 m.y. for the latest major met morphism. Two samples of biotite from the Fordha gneiss appear to be significantly older, suggesting eith that they contain some impurity such as amphibole whic may carry excess argon or that they actually are older. A. L. A.

# APPARATUS AND TECHNIQUES

## Chemical, gravimetric, and volumetric

**Izáková (K.).** [*Complexometric determination of magnesium and calcium in samples containing a higher content of magnesium.* Chem. Zvesti, 1957, **11**, 205–211.] Anal. Abstr., 1958, **5**, abstr. 2127.

The procedure for determining Ca and Mg in dolomite or magnesite using EDTA is discussed. When Mn is present it must be separated, or masked with triethanolamine. [M.A. **13**–259, 434, 509] R. A. H.

**Watts (H. L.).** *Volumetric determination of aluminium in presence of iron, titanium, calcium, silicon, and other impurities.* Anal. Chem., 1958, **30**, 967–970.

Following decomposition and solution of the sample any appreciable Si is removed with HF. Ca is precipitated as the oxalate and further HF is added to the Al solution at pH 10. Hydroxide released is titrated with standard acid to starting pH. Fe and Ti precipitate as hydroxides and do not interfere. Results are given for bauxite, clay, feldspar and rock samples G–1 and W–1 (U.S. Geol. Survey). R. A. H.

**Dodson (V. H.) & Black (A. H.).** *The use of NNN'N tetrakis(2-hydroxypropyl)ethylenediamine in the dete mination of the $R_2O_3$ group in limestone.* Ohio Jour Sci., 1956, **56**, 147–150.

Quantitative precipitation of $Fe^{III}$ and Al occurs in t presence of this reagent over a pH range of 6·0 to 6·5, wi negligible co-precipitation of Ca and Mg. There is go agreement between the results obtained using the standa double precipitation with $NH_3$ aq. and a single precipitati with this reagent. R. A. H.

**Rafols Rovira (J. M.).** [*Complexometric determination calcium in sodium sulphate minerals.* Inf. Quim. Ana 1957, **11**, 143–144.] Anal. Abstr., 1958, **5**, abstr. 213

The mineral is dissolved in water, filtered, and an aliqu of the solution titrated with 0·1 *M* EDTA with murexi as indicator. For 70 samples containing 4·7% Ca the resu were in close agreement with the gravimetric determinati of Ca as oxide after precipitation as oxalate. R. A. H.

**Jackson (P. J.).** *The determination of ferrous iron in pulverised-fuel ash and slags from pulverised-fuel-fired boilers.* Journ. Applied Chem., 1957, **7**, 605–610.

The method of Wilson [M.A. **13**–257] for the determination of FeO in silicates is modified for samples of 0·05 to 0·1 g. and to ensure an error of less than 0·05% on samples containing 1 to 10% FeO. R. A. H.

**Voinovitch (I. A.).** [*New methods of analysis of silicates.* Chim. Anal., 1957, **39**, 454–460.] Anal. Abstr. 1958, **5**, abstr. 2929.

A critical examination of several recent chemical and physical methods of analysis of natural silicates, ceramics, and refractories leads to the conclusion that a combination of chemical and physical methods of analysis will give greater precision than either alone. R. A. H.

**Kao (Sheau-Shya), Tai (Shu-Kuei), & Cheng (Shu-Hui).** [*Determination of* (*a*) *tungsten in wolframite and scheelite and of* (*b*) *molybdenum in molybdenite.* Acta Chim. Sinica, 1956, **22**, 327–334.] Anal. Abstr., 1958, **5**, abstr. 487. R. A. H.

**[Senderova (V. M.)]** Сендерова (В. М.). Сокращенный анализ вольфрамитов. [*Rapid analysis of wolframites.*] Труды Минер. Муз. Акад. Наук СССР [Trans. Miner. Mus. Acad. Sci. USSR], 1957, **8**, 108–115.

A detailed account of a rapid and precise analysis of wolframite, hübnerite, ferberite and scheelite is given. S. I. T.

**Tucker (B. M.).** *Calcein as an indicator for the titration of calcium with ethylenediaminetetra-acetate.* Analyst, 1957, **82**, 284–285.

The advantages of calcein over murexide are its greater sensitivity to Ca and, when thymolphthalein is added, its more satisfactory colour change. Details are given for the determination of Ca in the presence of large proportions of Mg. [M.A. **13**–259, 434] R. A. H.

**Wolszon (John D.), Hayes (John R.), & Hill (William H.).** *Applications of anion exchange resins to determination of boron.* Anal. Chem., 1957, **29**, 829–832. [M.A. **13**–76]. R. A. H.

**Wallraf (M.).** *Gerät zur optischen Endpunktsbestimmung bei der Calcium-und Magnesium-Titration mit Äthylenendiamintetraacetat* (ÄDTA). Zeits. anal. Chem., 1957, **156**, 332–335, 3 figs.

An optical system, selenium cell, and interference filter with maximum transmission at 620 mμ are used to determine the end-point in the titration of Ca and Mg with EDTA. Using either murexide or Eriochrome black T indicator one drop of 0·001*M* EDTA can be detected, giving an accuracy at least as good as gravimetric methods. R. A. H.

**Goswami (N.).** *Estimation of ferrous oxide in chromite.* Sci. and Culture, 1957, **22**, 398–400.

A mixture of finely powdered ore and ceric sulphate in a mixture of phosphoric and sulphuric acids is heated at 290° to 300°C for ninety minutes, the excess ceric sulphate being determined by the usual methods. R. A. H.

**Riley (J. P.).** *Simultaneous determination of water and carbon dioxide in rocks and minerals.* Analyst, 1958, **83**, 42–49, 1 fig.

The samples are inserted in a combustion tube at 1100° to 1200°C., the resultant water and carbon dioxide being removed by means of a current of nitrogen, absorbed in separate absorption tubes, and determined gravimetrically. Full details are given of the apparatus and procedure : water is completely removed from even the most resistant minerals, such as staurolite, within 30 minutes at 1200°C. A comparison is made between various methods of determining water in rocks and it is concluded that the methods of both Penfield [1894] and Shapiro & Brannock [1955] tend to give low results. The results are given of replicate determinations of water in the relatively refractory silicates epidote, staurolite, topaz, talc, and phlogopite, and of the simultaneous determination of water and carbon dioxide in scapolite and in various carbonates. Using a 0·5 g. sample for rocks containing 5% water the standard deviation was ±0·04%. R. A. H.

**de Longuyon (I. Gorcey).** *Massanalytische Schnellbestimmung des $Al_2O_3$-Gehaltes in Tonen und Schamotten mit Hilfe von Komplexon.* Ber. dtsch. keram. Ges., 1958, **35**, 155–158.

A critical assessment of the method of I. Sajó, whereby EDTA is added to the Al-containing solution, the excess being compensated with zinc acetate solution. Addition of sodium fluoride releases the EDTA bound by the aluminium, which can then be titrated with zinc acetate solution using ferro-ferricyanide and benzidine as indicator. The method has been applied to various silicates and appears more accurate than other rapid methods ; only $TiO_2$ interferes, but not at a concentration of $< 3\%$. R. C. M.

**Voinovitch** (**I. A.**) & **Debras** (**J.**). [*The precision and rapidity of certain chemical and physical determinations of alumina in aluminosilicates.* Chim. Anal., 1957, **39**, 418–428.] Anal. Abstr., 1958, **5**, abstr. 2556.

Details are given of the following methods for the determination of Al: (a) precipitation with excess of oxine, in the presence of $SiO_2$, with bromatometry of the excess; (b) gravimetric determination of $Al_2O_3 + TiO_2$ with ammonium benzoate, after removal of $SiO_2$ and reduction of $Fe_2O_3$; (c) precipitation with aqueous $NH_3$ after removal of $SiO_2$ by double dehydration with HCl; (d) precipitation with aqueous $NH_3$ after a single dehydration of $SiO_2$ with HCl and removal with gelatin solution; (e) spectrophotometric determination with ferron; (f) quantitative spectrography. Figures are given for replicate determinations in clays and other samples. Method (f) is considered to be the most rapid and specific, method (a) is precise and reproducible and is the most rapid chemical method of those studied, and method (b) is the choice when speed is not the main consideration. The classical $NH_3$ procedures are the most simple but give systematically high, though reproducible, results. [M.A. **13**–435, 436, 511, 512, 572, 574] R. A. H.

### Photometric

**Feinstein** (**H. I.**). *Spectrophotometric determination of uranium in ores.* U.S. Atomic Energy Comm., Rept. **TEI–555**, 1955, 16 pp.

The yellow complex of $U^{VI}$ with thiocyanate is used, following extraction with ethyl acetate. Results are reported for a number of vanadium-bearing ores.

R. A. H.

**Lott** (**Peter F.**) & **Cheng** (**K. L.**). *Spectrophotometric determination of iron in clay and limestone.* Anal. Chem., 1957, **29**, 1777–1778.

The method is based on the fact that EDTA complexes the metal cations and produces a colour reaction only with the iron found in this material, when hydrogen peroxide is added. This chelating agent thus simultaneously prevents interference and acts as a colour-forming agent. R. A. H.

**Manna** (**Louis**), **Strunk** (**D. H.**) & **Adams** (**S. L.**). *Flame spectrophotometric determination of microgram quantities of magnesium.* Anal. Chem., 1957, **29**, 1885–1887.

The atomic line at 285·2 mμ is used, the radiant power of Mg being enhanced by aspirating from an 80% acetone solution. The inhibitory action of aluminium was avoide by use of a multiple-ion radiation buffer. Results ar quoted for limestone and magnesite. [M.A. **13**–144] R. A. H.

**Chalmers** (**R. A.**). *A spectrophotometric micro-titration c calcium.* Analyst, 1954, **79**, 519–521.

Ca is titrated with EDTA using a micro-syringe, wit murexide as indicator, the whole titration taking place i the modified cell of a spectrophotometer. The end point obtained by plotting the optical density against the volum of titrant added. R. A. H.

**Henderson** (**E. H.**), **Owers** (**M. J.**) & **Webb** (**M. S. W.**). *Th spectrochemical determination of lithium in Cornis china clay.* A.E.R.E. Rept. **C/R 2137**, 1957, 13 pp

Procedures are given for the determination of lithium i finely ground micaceous materials by either emissio spectroscopy or flame photometry [M.A. **13**–144, 323, 510 R. A. H.

**Kramer** (**Henry**). *The flame photometric determination c calcium in phosphate, carbonate, and silicate rock* Anal. Chim. Acta, 1957, **17**, 521–525.

Aluminium and phosphorus interference was overcome b the addition of a large excess of magnesium. Resul obtained are within ±2% of the CaO content: values a quoted for several standards including G–1 (1·36) an W–1 (11·0) of the U.S. Geological Survey. [M.A. **13**–144] R. A. H.

**Culkin** (**F.**) & **Riley** (**J. P.**). *The spectrophotometric dete mination of gallium in rocks and minerals.* Analys 1958, **83**, 208–212.

The determination of gallium in silicate, oxide, sulphat and carbonate minerals is described. The use of a mixe solvent consisting of chlorobenzene containing 25% carbon tetrachloride is recommended for the spectrophot metric determination of gallium since it extracts rhodami B chlorogallate completely from 6·5*N* HCl: this procedu has three times the sensitivity of an earlier method [M. **13**–75]. For rocks G–1 and W–1 the values obtained we 21·3 and 21·5 p.p.m. Ga respectively. R. A. H.

**Hortsman** (**E. L.**). *Flame photometric determination lithium, rubidium and cesium in silicate rocks.* An Chem., 1956, **28**, 1417–1418.

Following decomposition with HF and $H_2SO_4$ t ammonia group is precipitated with solid $CaCO_3$, and

removed from the filtrate by precipitation as the sulphate in 50% ethyl alcohol : the alcohol is later removed by evaporation. Flame interference from Na and K is compensated by use of appropriate standard solutions with a flame spectrophotometer. In the range 10 to 200 p.p.m. of the alkali metal the accuracy is within 10% : values for the granite (G–1) and the diabase (W–1) are 22 and 14 p.p.m. respectively for Li, and 204 and 19 p.p.m. respectively for Rb. [M.A. **13**–144, 323, 510, **14**–11] R. A. H.

**Isono (Kiyoshi).** *Photometric determination of small amounts of nickel in ores.* Japan Analyst, 1957, **6**, 557–561.

Slight modifications are proposed for the dimethylglyoxime method. The gravimetric determination of <0·2% Ni in ores is inaccurate due to incomplete precipitation especially when much Fe is present [M.A. **13**–75, 436, 512]. R. A. H.

**Ward (F. N.) & Crowe (H. E.).** *Colorimetric determination of traces of bismuth in rocks.* Bull. U.S. Geol. Surv., 1956, **1036**–I, 173–179.

A method devised for determining traces of bismuth, primarily for use in geochemical prospecting, is based on the reaction of bismuth with carbonate in a cyanide medium and the subsequent extraction of the yellow complex with chloroform. The procedure is applicable to rocks with 10 to 300 p.p.m. Bi, and with slight modifications the range may be extended upwards. R. A. H.

**Bodenheimer (W.).** *Determination of magnesium oxide in silicates.* Bull. Res. Council Israel, C, 1957, **6**, 73.

To avoid the titration of Ca before determining Mg with EDTA the Ca can be precipitated as oxalate and the Mg precipitated from the filtrate once only with ammonium phosphate. The $MgNH_4PO_4$ is then dissolved and the P determined colorimetrically. R. A. H.

**Riley (J. P.) & Sinhaseni (P.).** *The determination of copper in sea water, silicate rocks and biological materials.* Analyst, 1958, **83**, 299–304.

The procedures are detailed for the extraction and spectrophotometric determination of small amounts of copper in silicate and carbonate rocks using 2 : 2′-diquinolyl in *n*-hexanol as a specific reagent. For G–1 and W–1 (U.S. Geol. Survey) the method gave 15·9 and 121 p.p.m. of copper respectively, while a gabbro from Colmonell, Ballantrae [Ayrshire], had a copper content of 29·8±1·1 p.p.m. [M.A. **13**–75, 250, 437] R. A. H.

**Degenhardt (Heinz).** *Die Bestimmung kleiner Zirkoniumgehalte in Gesteinen, Mineralien und Gewässern.* Zeits. anal. Chemie, 1956, **153**, 327–335.

Following decomposition of the sample by fusion with a mixture of NaOH and $Na_2O_2$, Zr is separated and determined colorimetrically with alizarin red S at 546 mμ. Results are given for the standard rock samples G–1 and W–1. R. A. H.

## Spectrographic

**Gorovaya (B. S.) & Aĭdarov (T. K.).** [*Spectrographic determination of the oxides of calcium and magnesium in clays.* Trudy Vses. Nauk Inst. Galurgii, 1956, 191–194.] Anal. Abstr., 1958, **5**, abstr. 1460.

A thin layer of the powdered clay is deposited from suspension on to a copper plate which serves as the lower electrode. R. A. H.

**Shaw (D. M.).** *Some aspects of the determination of barium in silicate rocks.* Spectrochimica Acta, 1957, **10**, 125–127.

A spectrographic method for determining barium in silicates using lanthanum as an internal standard is described and the lines used are Ba 4934 and La 4291. The method is subject to a matrix effect since the La line is much more strongly enhanced than the Ba line in the presence of iron. Using suitable working curves Ba contents can be determined with a precision of ±20% for a 95% probability range. G. D. N.

**Medek (J.) & Valeška (F.).** *Die quantitative Spektralanalyse kleiner Mengen von Cs und Rb.* Proc. Colloquium Spectroscopicum Internationale VI, (1956) : Spectrochim. Acta, 1957, Supplement to **11**, 67–70.

Cs and Rb were excited in an acetylene-air flame and the emitted light recorded photographically. Cr was used as a reference element, the line 4254·35Å being used. For the concentration ranges $1\times10^{-3}$ to $5\times10^{-6}$ mol. Cs and $1\times10^{-4}$ to $3\times10^{-5}$ mol. Rb, Cs 8521·10Å and Rb 7800·83Å were recorded. The mean errors of almost 100 analyses were ±2·2% for Ca and ±3·5% for Rb. The addition of a small amount of Ba to the analysed solution may improve the sensitivity for Cs. G. D. N.

**Dennen (W. H.) & Fowler (W. C.).** *Spectrographic analysis by use of mutual standard method.* Bull. Geol. Soc. America, 1955, **66**, 655–662, 5 figs.

The mutual standard method utilizes the inter-relationship of spectral line intensities and element concentrations to analyse simultaneously all the major rock-forming constituents and some minor elements. A relative deviation (% standard deviation) of 10% is obtained, and the analytical time required is less than two hours for a triplicate analysis. Results are given for several chemically analysed igneous rocks and for the variation with depth of both major and minor oxides in a shale. R. A. H.

**Scharrer** (**K.**) & **Judel** (**G. K.**). *Spektrochemische Spurenanalyse nach vorheriger Anreicherung.* Proc. Colloquium Spectroscopicum Internationale VI, (1956) : Spectrochim. Acta, 1957, Supplement to **11**, 377–381.

A method is proposed for increasing the precision of spectrochemical trace element analysis by concentrating the trace elements in a matrix containing at least 95% iron before d.c. arcing. The sample is taken into solution, the alkalis, alkaline earths, aluminium and titanium fixed as complex salts of sulpho-salicylic acid and the trace elements precipitated with Na-pyrrolidine-dithiocarbamate at pH 4·8 before extraction with chloroform (after Stetter and Exler). The extract contains quantitatively the elements Ag, Bi, Cd, Co, Cu, Fe, Ga, In, Mn, Mo, Ni, Pb, Pd, Sn, V, and Zn. Arcing details are given for anode excitation in graphite electrodes. Standard deviations of analyses for Co, Cu, Mn, Mo, Ni, and V with Fe as internal standard are about 2–5%; of Pb, Zn, and Sn with Cd as internal standard about 4–7%. Concentration factors are in the range 20–4000. G. D. N.

**Canney** (**F. C.**), **Meyers** (**A. T.**), & **Ward** (**F. N.**). *A truck-mounted spectrographic laboratory for use in geochemical exploration.* Econ. Geol., 1957, **52**, 289–306, 6 figs.

Details are given of the design and construction of a mobile spectrographic laboratory used by the U.S. Geological Survey. One man was able to make 2832 semiquantitative determinations on 354 samples in 12 days. Such equipment is useful in the early stages of a geochemical exploration project to determine diagnostic suites of elements, and later, to guide the day-to-day sampling. R. A. H.

**Nedler** (**V. V.**). [*Spectrographic determination of small amounts of niobium in ores and refining products.* Zavod. Lab., 1957, **23**, 1336–1337]. Anal. Abstr., 1958, **5**, abstr. 2599.

Samples are decomposed with HF and $H_2SO_4$, Nb i precipitated from solution with tannin, the ignited oxide are arced with powdered quartz and $ThO_2$, and the line Nb 3163·40–Th 3154·73Å or Nb 2927·81–Th 2942·86Å ar measured. R. A. H.

**Maslennikov** (**B. M.**) & **Romanova** (**L. V.**). [*Spectrographi semi-quantitative determination of boron in ores an minerals.* Zavod. Lab., 1957, **23**, 1327–1328.] Anal Abstr., 1958, **5**, abstr. 2552.

Copper electrodes are used and the B lines 2496·77 an 2497·73Å are compared with standards [M.A. **13**–571]. R. A. H.

**Dixon** (**K.**). *Spectrochemical methods of analysis as applie to mineral matter associated with coal.* Analyst, 1958 **83**, 362–371.

Solutions are prepared by wet oxidation or by fusing th sample and then extracting the melt. Si, Al, Fe, Ca, Mg Ti, Mn, Cu, Sr, and Ba are determined using a spectro graphic method in which the solution is absorbed by porous graphite electrode before sparking : Cr is chosen a the internal standard and the line pairs used are listed Na and K are determined flame photometrically. Result using this method are compared with those obtained usin normal chemical methods for several specimens of coal ash slag, flue dust, and also of diabase W–1 (U.S. Geol. Survey) the precision is ±2–3% and the proposed method is som three or four times as rapid [M.A. **13**–572]. R. A. H.

**Turekian** (**K. K.**), **Gast** (**P. W.**), & **Kulp** (**J. L.**). *Emissio spectrographic method for the determination of strontiu in silicate materials.* Spectrochimica Acta, 1957, 40–46.

The effects of a varying matrix have been diminished b the addition of Sr-free $CaCO_3$. The precision is of th order of 7–12% standard deviation. Results are give for several rocks, including G–1 and W–1, obtained b both this method and that of stable isotope dilution. R. A. H.

**Dennen** (**William H.**). *Spectrographic determination carbon in sedimentary rocks, using direct-current a excitation.* Spectrochimica Acta, 1957, **9**, 89–97.

Using copper electrodes the bandhead CN 3883Å measured : a coefficient of variation of 13% is obtaine Variations due to the matrix etc. must be controlled b comparing unknown samples with chemically simil

tandards, maintaining uniform arcing conditions, and liluting samples with quartz. Separate determinations are equired for carbonate carbon and graphitic carbon.

R. A. H.

**olodovnik (S. M.), Rusanov (A. K.), & Kondrashina (A. I.).** [*Spectrographic determination of scandium in minerals, ores and products of refining.* Zhur. Anal. Khim., 1957, **12**, 372–376.] Anal. Abstr., 1958, **5**, abstr. 419.

For determining Sc (0·01 to 0·5%) in khlopinite, wolframite, cassiterite, and beryl the sample is mixed with carbon and lanthanum oxide : in a d.c. arc the line pairs used are Sc 2552·36–La 2610·34 and Sc 3253·7–La 3376·33. Separate standards are used for each mineral. A method of prior chemical concentration is also outlined. R. A. H.

**Harvey (C. O.) & Murray (K. L. H.).** *A spectrographic method for the determination of rarer elements in silicates.* Analyst, 1958, **83**, 136–143, 1 fig.

A general method using a d.c. carbon arc is described for the determination of trace elements in rocks and silicate minerals. A compromise between simple direct methods and more accurate methods in which a selected internal standard is added for the particular element to be determined is adopted, calcium sulphate being used for the spectrographic buffer and internal standard. Full details are given of the selected spectrum lines used, with comments on possible interference : the reproducibility of the method is indicated. R. A. H.

### Petrographical

**East (Florian).** *Nouvelle méthode de dosage de la brucite dans les minerais.* Ann. Assoc. Can.-Franç. Av. Sci. 1953, **19**, sect. VI, 108–113, 5 figs.

Quantitative determination of brucite in its ores is accomplished by using the Chénevard thermal balance. Accuracy of the method is better than 1% where the content of serpentine [and other silicates] is lower than 10%. This method is adequate for measuring the quantity of brucite in its ores. G. P.

**Hosking (K. F. G.).** *Flame and allied tests for minerals in review.* Mining Mag., 1958, **98**, 201–206.

The ' classical flame tests ' are reviewed, with remarks on the distinction between Ca and Sr, Li and Sr, and Na and K. Flame tests are also detailed for use with refractory and other materials including tests for Li, Na, and K in silicates, tests for borates, phosphates, the naturally occurring sulphates of the alkaline earths, and the chloride ion, and for Sn, Au, and Bi. The technique of microchemical flame analysis in which oxide, metal, and halide sublimates are deposited and later examined by microchemical means is outlined. [M.A.**14**–78] R. A. H.

**Gradwell (R.).** *A simple fusion method for determination of plagioclase feldspar from thin section.* Amer. Min., 1958, **43**, 368–370, 1 fig.

A small chip of feldspar is fused at the tip of a discharging electrode, then it is cooled to a glass. An apparatus and procedure are described. B. H. B.

**Rosenblum (S.).** *Improved techniques for staining potash feldspars.* Amer. Min., 1956, **41**, 662–664.

Modifications in the technique of Chayes [M.A. **12**–27], allowing greater control of the HF etch and a simpler method of applying the cobaltinitrite stain. Details are given of methods for removing previous stains. [M.A. **4**–219, **8**–17] R. A. H.

**Jackson (E. D.) & Ross (Donald C.).** *A technique for modal analyses of medium- and coarse-grained* (3–10 *mm.*) *rocks.* Amer. Min., 1956, **41**, 648–651.

**Plafker (George).** *A technique for modal analyses of some fine- and medium-grained* (0·1–5 *mm.*) *rocks.* Amer. Min., 1956, **41**, 652–655.

The hand-specimen of a rock is sawn, ground, or polished to provide a smooth surface, etched and stained to assist in mineral identification, and a point count made under a magnifier. For the coarser rocks dot pattern Zip-A-Tone is applied to the surface, this overlay being essentially a simultaneous projection of a point counter pattern (dots 1½ mm. apart are recommended), while for the medium grained rocks a standard point counter mechanism is fitted to an adapted binocular microscope. Modifications of the usual sodium cobaltinitrite stain for potassium are given [M.A. **12**–27 and see **Rosenblum** above], and a $K_2CrO_4$ stain is used for distinguishing olivine from pyroxenes. [M.M. **30**–147 ; M.A. **6**–213, **11**–277] R. A. H.

**Roubault (Marcel), Bernard (André), & Blazy (Pierre).** *Séparation quantitative directe des minéraux d'un granite par flottation différentielle.* C.R. Acad. Sci. Paris, 1957, **245**, 1256–1258.

In an investigation of a granite containing quartz,

feldspar, muscovite, and biotite, together with accessory apatite, sphene, and limonite, the percentages of quartz, feldspar, and micas have been estimated following their separation by differential flotation. The micas after activation with $Al(NO_3)_3$ were selectively floated at pH 5, the feldspars then being separated at pH 2, the quartz being depressed by HF. For the feldspars the recovery was 96% and the purity of the samples was 99·55% with 0·15% micas and 0·3% quartz. R. A. H.

### Optical, X-ray, and other

**deJong (G. de Josselin).** *Verification of use of peak area for quantitative differential thermal analysis.* Journ. Amer. Ceram. Soc., 1957, **40**, 42–49, 15 figs.

D.T.A. analyses of reference mixtures show that errors in quantitative determinations may be caused by variations in density and heat conductivity as well as heat transfer through the thermocouple wires. These effects are minimized by standardization of packing methods and calibration of each new thermocouple. P. K. H.

**Cameron (Eugene N.).** *Apparatus and techniques for the measurement of certain optical properties of ore minerals in reflected light.* Econ. Geol., 1957, **52**, 252–268, 8 figs.

The quantitative measurement of the rotation properties of anisotropic opaque minerals in reflected light is discussed. The theory of the methods of measurement is reviewed, various microscope equipment is described, and the procedures of measurement detailed. [M.A. **1**–198, **10**–158; M.M. **30**–49] R. A. H.

**McTaggart (G. Don) & Andrews (A. I.).** *Immiscibility area in the system $TiO_2$-$ZrO_2$-$SiO_2$.* Journ. Amer. Ceram. Soc., 1957, **40**, 167–170, 2 figs.

A furnace for use with the X-ray spectrometer is capable of heating small powdered specimens in air to 1850°C. Quenching from this temperature with air is possible. Two liquids exist over most of the $TiO_2$ (rutile) primary-phase area, with rutile the primary crystal beneath both liquids. P. K. H.

**Chayes (F.) & Mackenzie (W. S.).** *Experimental error in determining certain peak locations and distances between peaks in X-ray (powder) diffractometer patterns.* Amer. Min., 1957, **42**, 534–547.

Random errors are estimated for sets of readings which give the locations and distances between peaks in X-ray diffractometer patterns of quartz and of synthetic albites. Investigation is made of the way results and random erro are affected by direction of scanning, re-insertion specimen, method of preparing specimen mount, and ra meter scale factor. "Smear" mounts and "pressed mounts give significantly different peak positions but mo of the random error appears to be associated with setti up the specimen. Appendices describe the methods statistical analysis employed. J. Z.

**Joel (N.) & Garaycochea (Isabel).** *The 'extinction curv in the investigation of the optical indicatrix.* Act Cryst., 1957, **10**, 399–406, 5 figs.

A single crystal is mounted on a single axis goniomet (perpendicular to microscope axis) affixed to the stage of polarising microscope. The extinction positions are plott on a stereogram at regular intervals of goniometer setti yielding the two parts of an 'extinction curve'. The thr axes of the indicatrix may then be located on the extincti curve by a procedure described. Tests of accuracy a a mathematical treatment of the method are also give [M.M. **29**–206, **29**–602, **31**–860, 878; M.A. **12**–594] J. Z.

**Pabst (A.).** *Lattice constants from Weissenberg patter* Amer. Min., 1957, **42**, 664–666, 1 fig.

Narrow strips containing *c*-axis zero layer reflections fr a single crystal of quartz are recorded at each end of t Weissenberg film. Calibration of Weissenberg patter can thereby be achieved with accuracy of 2 to 4 parts 10,000. [M.A. **13**–433] J. Z.

**Spurr (Robert A.) & Myers (Howard).** *Quantitative analy of anatase-rutile mixtures with an X-ray diffractomet* Anal. Chem., 1957, **29**, 760–762. R. A. H.

### Mass spectrographic, X-ray spectrometric, Various

**Herzog (L. F.) & Pinson (W. H. Jr.).** *The Sr and contents of the granite G–1 and the diabase W* Geochim. Cosmochim. Acta, 1955, **8**, 295–298.

A mass spectrometric method for analysing the int laboratory rocks G–1 (granite, Westerly, Rhode Isla and W–1 (diabase, Centerville, Virginia) for Sr and using the isotope dilution method is concisely describ Sr is 233 p.p.m. in G–1 and 177 p.p.m. in W–1; Rb 216 p.p.m. in G–1 and 28·5 p.p.m. in W–1. These resu believed to have an absolute error of ± 5%, are tabula with those derived by other workers using differ analytical methods. [M.A. **12**–264] J. R. B.

**Ivanov (A. A.)** & **Sheina (Z. G.)**] Иванов (А. А.) и Шеина (З. Г.). О применении электродиализа к изучению бурых железняков. [*On the application of electrodialysis to the study of brown iron ores.*] Зап. Всесоюз. Мин. Общ. [Mem. All-Union Min. Soc.], 1956, **85**, 413–416, 4 figs.

Methods and apparatus are described. The application o minerals has shown a difference between brown iron re from a pyritic gossan and that of sedimentary origin.
S. I. T.

**Baranov (V. T.)** & **Tleubergenova (G.)**] Баранов (В. И.) и Тлеубергенова (Г.). Применение метода микрорадиографии с использованием жидких эмульсий для изучения содержания и распределения радиоэлементов в горных породах. [*The application of the method of microradiography with the use of liquid emulsions for the study of the content and distribution of radio-elements in rocks.*] Геохимия [Geochemistry], 1956, no. **2**, 62–67, 3 figs.

The method is described. The photosensitive liquid mulsion is spread over the surface of a rock section and races of α particles are recorded under the microscope nd the radioactive minerals are plotted on a map. For ield work the use of a dry powdered emulsion is recomnended.
S. I. T.

**De Lange (P. W.).** *The determination of uranium and thorium in urano-thorianite and monazite by the 'Equilibrium' method.* Trans. Geol. Soc. South Africa, 1957, **59** (for 1956), 259–273, 3 figs.

Some modifications of the beta-gamma equilibrium nethod are given and the detailed procedure described.
E. D. M.

**Földvári-Vogl (M.).** *The role of differential thermal analysis in mineralogy and geological prospecting.* Acta geol. Hungarica, 1958, **5**, 1–102, 18 figs, 36 pls.

A review with 177 references. After a brief account of heory, apparatuses are described with particular reference o those used by the author. Curves for a very wide range f minerals are reproduced and discussed (many from the iterature, but a number previously unpublished), and the pplication of the technique to practical problems is onsidered.
R. C. M.

**Salmon (L.).** *The determination of sodium and potassium in a sample of dunite by radioactivation analysis.* A.E.R.E. (Harwell), 1957, Rept. **C/M 323**, 6 pp.

The radioactivation of dunite and radiochemical separation methods for the determination of Na and K are described.
R. A. H.

**Becquerel (G.).** *Nouvelle méthode de dosage de l'uranium, du radium, du thorium et de l'actinium dans les particules fines de minerai radioactif.* Journ. Phys. Radium, 1956, supplement to **17**, 138A–142A.

This method permits the determination of U, Ra, Th and Ac in a sample of radioactive mineral of only 0·01 mm and emitting only one α-particle per second. R. A. H.

**Steele (T. W.).** *Development of methods for the chemica determination of uranium.* Journ. South African Inst. Min. Metall., 1956, **57**, 144–152.

A review is given of rapid routine procedures for the separation and determination of various amounts of U from siliceous ores and minerals. The specific applicability, limitations and analytical difficulties of various methods are indicated. The U in high grade ores can be best determined by reduction and titration with $K_2CrO_4$, or gravimetrically as ammonium diuranate or hydroxyquinolinate followed by ignition to $U_3O_8$. R. A. H.

**Iordanov (N.)** & **Kocheva (L.).** [*Determination of small quantities of lead in minerals and rocks.* Izv. Khim. Inst. Bulgar, Akad. Nauk, 1956, **4**, 327–339.] Anal. Abstr., 1958, **5**, abstr. 1480.

Two alternative methods are given, leading to the separation of Pb and its estimation polarographically with an error of 3–10% for 1–50 μg of Pb [M.A. **13**–576].
R. A. H.

**Cabell (M. J.)** & **Smales (A. A.).** *The determination of rubidium and caesium in rocks, minerals and meteorites by neutron-activation analysis.* Analyst, 1957, **82**, 390–406.

After irradiation, radiochemical separations in the presence of carriers are based on ferric hydroxide scavenges, cobaltinitrite separations and cation-exchange chromatography, the Rb and Cs fractions finally being recovered for beta-gamma activity counting as their chloroplatinates. Each determination requires 15–300 mg. of sample : for material containing 10 p.p.m. or more of either Rb or Cs results are probably within ±5% of the absolute value. Results are given for an international inter-comparison suite of lepidolites and for other specimens of lepidolite,

beryl, microcline, G–1 Westerley granite and W–1 Centerville diabase, eleven rock specimens from the Skaergaard intrusion of east Greenland, and eight stony meteorites. [M.A. **14**–6, 7, 10] R. A. H.

**King** (**Lewis H.**) & **Whitehead** (**Walter L.**). *Vacuum differential thermal analysis of coal.* Econ. Geol., 1955, **50**, 22–41, 19 figs.

The vacuum d.t.a. curves of vitrains from coals of widely different rank show an increase in peak temperature with increasing rank. This may be correlated with the fixed carbon values and it is concluded that the fixed carbon content of a vitrain provides a better index of rank than that of an average coal sample. R. A. H.

**Perey** (**M.**) & **Hettler** (**A.**). *Dosage de l'actinium dans les minerais.* C.R. Acad. Sci., Paris, 1956, **243**, 1520–1522.

The actinium in any radioactive mineral can be determined by extraction as sulphate followed by selective precipitation and the measurement of the activity of the precipitate. Great sensitivity is claimed and Ac can be determined in the presence of 100 times as much Ra. R. A. H.

**Everest** (**D. A.**) & **Martin** (**J. V.**). *The determination of thorium in ores with APANS-mesotartaric acid reagent after a shortened chromatographic separation.* Analyst, 1957, **82**, 807–811.

Th is separated from gross amounts of other elements by elution on a cellulose-alumina column and determin by a selective absorptiometric finish with APANS, *me* tartaric acid [M.A. **13**–438] being used as a masking ag for Zr. Results are quoted for Th in monazites and thor [M.A. **13**–437]. R. A. H

**Agrinier** (**H.**). *Applications de la chromatographie ascenda de partage sur papier, à la détermination de certa éléments dans les minéraux. II. Détermination estimation semi-quantitative de l'argent, du nickel, cobalt, du cuivre, du niobium, du tantale et du tita* Bull. Soc. franç. Min. Crist., 1957, **80**, 275–2 3 figs., 1 pl. (coloured).

Using the techniques previously described [M.A. **13**–5 methods are presented for the rapid detection and se quantitative determination of Ag, Ni, Co, Cu, Nb, Ta, a Ti by comparison with the colorations obtained on str with standard solutions. Full details are given for separation and characterization of these elements [M **13**–75]. R. A. H

**Lohr** (**Erika**). *Chromatographische Untersuchung Braunkohle.* Medd. Dansk Geol. Foren., 1957, 441–442.

The ether-soluble yellow pigment in Danish Mioc lignites was investigated by paper chromatography and spectrophotometry. The yellow substance has the form $(C_8H_{13}O)_n$ and is not a carotinoid. H. M

## BIBLIOGRAPHIES

**Jones** (**Harriet Nell**). *Selected annotated bibliography of the geology of uraniferous and radioactive native bituminous substances, exclusive of coals, in the United States.* Bull. U.S. Geol. Survey, 1958, no. **1059-D**, 177–203. K. S.

**King** (**Ruth Reece**), and others. *Bibliography of North American Geology,* 1955. Bull. U.S. Geol. Survey, 1958, no. **1065**, 511 pp. Price $1·50.

Contains 115 subjects under ' Mineralogy ' in the index. K. S.

**Avery** (**Ruth Butler**), **Conant** (**Mary Lou**), & **Weissenborn** (**Helen F.**). *Selected annotated bibliography of asbestos resources in the United States and Canada.* Bull. U.S. Geol. Survey, 1958, **1019–L**, 817–865.

The 198 references from pre-1956 literature refer mainly to the geology, mineralogy, and origin of asbes resources. K. S

**Pratt** (**Ethel M.**) & **Cornwall** (**Henry R.**). *Bibliography nickel.* Bull. U.S. Geol. Survey, 1958, **1019–K**, 755–8

This bibliography [987 entries] represents referen available to the authors in Washington, D.C. Referen are by author, location, and subject. Coverage is proba most nearly complete for publications on the geology ore deposits of nickel, but an attempt was also made include all available references on the history, econom metallurgy, and other aspects of the nickel indus [From author's abstract]. K. S

**Strand** (**R. G.**), **Koenig** (**J. B.**), & **Jennings** (**C. W.**). *In to geologic maps of California (to December* 31, 19 Calif. Div. of Mines Special Report **52**, 1958, 128 Price $1·00. K. S

# BOOK NOTICES

**oves (A. W.) [1908–56].** *Gypsum and anhydrite.* Mineral Resources Division, Overseas Geological Surveys, London (H.M. Stationery Office), 1958, iv+108 pp. Price 7*s.* 6*d.*

This useful monograph is one of a new series on economic inerals. Some additions have been made since the death the author, with statistics up to 1956. Accounts are ven of the methods of processing the materials for a wide nge of uses. Details of occurrence and mining are given r all countries ' in the free world '. L. J. S.

**ng (Jean).** *Précis de pétrographie : Roches sédimentaires, métamorphiques et éruptives.* Paris (Masson & Co.), 1958, 314 pp., 20 pls., 160 figs. 24½×18½ cm. Price 3600, bound 4600 fr.

The text is based on lectures to young students ; it is ncisely and clearly written and well set out on the inted page. The four parts (with an index for each) al with Rock-forming minerals (36 pp.), Sedimentary d residual rocks (86 pp.), Metamorphic rocks (51 pp.), d Eruptive rocks (104 pp.). The plates (numbered in the gination) show rock structures and photomicrographs, d the text-figures include excellent line-drawings of otomicrographs of thin sections. The book is heavy ¼ lb.), printed on thick paper, and bound in thick boards. e price is surely high for elementary students. A stinction is made between petrography (descriptive) and hology (rock-genesis), because petrology is liable to be nfused with petrol ; but equally, lithography might be nfused with printing. L. J. S.

**oboleva (M. V.) & Pudovkina (I. A.)]** Соболева (М. В.) и Пудовкина (И. А.). Минералы урана. Справочник. [*Uranium minerals. A reference book.*] Гос. Научно-Техн. Изд. [State Sci.-Techn. Publ.], Moscow, 1957, 408 pp., 206 figs. Price 20r. 90k.

This book is divided into two unequal parts : Part I : ethods of study of uranium minerals (pp. 5–27), Part II : scription of uranium and uranium-containing minerals p. 28–356), followed by tables, index and bibliography p. 358–408). Ninety-one uranium minerals and sixty anium-containing minerals are described in detail, each them provided with a full list of properties, analyses, ode of occurrence and other information. Much of the ta is of recent Russian origin. Many varieties of minerals are recorded, thus three varieties of uraninite and four varieties of nasturan are described. Among the minerals described in this book are the following :

P. 66. Hydronasturan, a mineral which A. J. Betekhtin considers primary, V. G. Melkov secondary. [M.M. **31**–962 ; A.M. **42**–442]

P. 129. Orlite (after locality not named). First described by V. G. Melkov in 1952. Occurs as small acicular crystals. System unknown. Yellow, waxy lustre, brittle, sp. gr. 5·307, biaxial, extinction straight, elongation negative, $\beta$ 1·788, $\gamma$ 1·793. Chemical analysis gave CaO 0·76, MgO 0·84, BeO 0·22, PbO 32·45, $Al_2O_3$ 2·54, $Fe_2O_3$ 0·80, $UO_3$ 43·57, $SiO_2$ 12·08, $P_2O_5$ 0·65, $As_2O_5$ 0·25, insol. 1·44, $H_2O$ 5·22, = 100·82. Formula $3PbO.3UO_3.4SiO_2.6H_2O$. [M.M. **31**–969 ; A.M. **41**–816. See also p. 59]

P. 181. Lermontovite (after M. Y. Lermontov, a Russian poet). First described by V. G. Melkov in 1952. Occurs as aggregates of acicular crystals of greyish-green colour, fragile, sp. gr. 4·50, extinction straight, variable index of refraction, $\alpha$ 1·562—1·574, $\gamma$ 1·702—1·726. Chemical analysis gave CaO 1·00, $R_2O_3$ 1·67, $SiO_2$ 2·38, $UO_2$ 36·33, $UO_3$ 14·53, $P_2O_5$ 20·40, $H_2O$ 8·72 F abs., = 85·03. Formula $(U,Ca,Ln)_3(PO_4)_4.6H_2O$. [M.M. **31**–965 ; A.M. **41**–816. See also p. 59]

P. 201. Hydrous uranophosphate of bismuth. First described by V. G. Melkov in 1945. System unknown. Fibrous crystals of yellow colour, vitreous lustre, brittle, very hard, extinction near straight, elongation positive, $n_1$ 1·722, $n_2$ 1·783. Similar to walpurgite.

P. 203. Przhevalskite (after N. M. Przhevalsky). First described by V. G. Kruglova in 1946. Occurs as flaxy aggregates of small tabular crystals of orthorhombic system. Bright yellow with a greenish tinge, vitreous lustre, biaxial, negative, elongation negative, extinction straight, $\alpha$ 1·739, $\beta$ 1·749, $\gamma$ 1·752, pleochroism $\alpha$ colourless, $\beta$ light yellow, $\gamma$ deep yellow, $2V \sim 30°$. Chemical analysis PbO 21·06, $SiO_2$ 4·10, $UO_3$ 46·55, $Al_2O_3$ 3·48, $P_2O_5$ 11·47, $H_2O$ 6·69, = 93·35. Formula $PbO.2UO_3.P_2O_5.4H_2O$. [M.M. **31**–970 ; A.M. **41**–816, **43**–381. See also p. 59]

P. 249. Moluranite (after its composition). Discovered by G. Y. Epstein in 1952. Found in the form of crusts in the walls of fissures in albitite. Black, pitchy lustre, H. 3–4, isotropic, $n$ 1·97–1·98. Chemical analysis gave $MoO_3$ 37·5, $U_3O_8$ 42·32, $SiO_2$ 4·56, $H_2O$ 15·4, = 99·78. Formula $UO_2.2UO_3.5MoO_3.12H_2O$. [M.M. **31**–967 ; A.M. **41**–816, **43**–380. See also p. 59]

P. 249. Iriginite (derivation of name not given). Discovered and described by G. Y. Epstein in 1951. Occurs as crusts made of fine acicular crystals. System unknown. Yellow, dull lustre, H. 4–5, sp. gr. 3·84, $\alpha$ 1·82, $\gamma$ 1·93. Chemical analysis gave CaO 0·46, $MoO_3$ 38·62, $UO_3$ 41·91, $UO_2$ abs., ign. loss 9·7, insol. 9·04,=99·73. Formula $UO_3.2MoO_3.4H_2O$. [M.M. **31**–962; A.M. **43**–379. See also p. 59]

P. 257. Sogrenite (derivation of name not given). A variety of a hydrocarbon containing about 60% of inorganic material composed of $UO_3$, $P_2O_5$, $Fe_2O_3$, $Al_2O_3$ etc. Found dispersed in carbonate veins. Chemical analyses and X-ray data are given. [M.M. **31**–972; A.M. **43**–382]

P. 293. Mendeleevite (after D. I. Mendeleev). First described by V. I. Vernadsky in 1914. This mineral differs from ellsworthite only in a lower content of water. Analyses and properties are given. [M.A. **2**–147, **10**–543]

P. 347. Lodochnikite (after V. N. Lodochnikov). Discovered and described by Y. D. Gotman in 19 Occurs as minute veinlets and obscure metallic cryst Black, pitchy lustre, H. 5–6, sp. gr. 5·48. Analysis g MgO 0·68, PbO 0·13, $Fe_2O_3$ 0·25, $Al_2O_3$ 0·12, $SiO_2$ 0· $ThO_2$ 3·96, $UO_2$, 16·45, $UO_3$ 35·41, $TiO_2$ 42·05, (Nb,Ta) 0·14, $H_2O$ 0·04, loss ign. 0·55, $CO_2$ 0·12,=100.11. Form $2(U,Th)O_2.3UO_3.14TiO_2$. It may be considered as be a uranium-rich variety of brannerite. [M.M. **31**–9 A.M. **42**–307, 1007. See also p. 59]

P. 350. Ufertite (after its composition). Discove and described by P. V. Veinezman and N. P. Balashov 1950. Occurs as elongated crystals and segregatio System unknown. Black with a brownish tinge, pit lustre, H. 6·6–7·2, sp. gr. 4·33. Analysis gave PbO 0· FeO 14·0, $Fe_2O_3$ 11·00, $Cr_2O_3$ 1·2 $Al_2O_3$ 0·2, TR 11·58, S 1·2, $TiO_2$ 59·12, $ThO_2$ 0·16, $UO_2$ 2·61, $V_2O_5$ 0·37,=101· Formula $20.FeO.8Fe_2O_3.4Ln_2O_3.UO_2.74TiO_2$. [M.M. 974; A.M. **42**–307. See also p. 59] S. I. T

# CLAY MINERALS

## Treatment & Methods

**Gregg (S. J.), Parker (T. W.), & Stephens (M. J.).** *The effect of grinding on kaolinite.* Clay Min. Bull., 1953, **2**, 34–44.

Surface area, true and bulk density, particle size distribution (by sieves and by air and water sedimentation), and moisture loss measurements at 100°C. and 1000°C. on samples of kaolinite ground for periods of up to 1000 hours in a ball mill, taken together with X-ray and differential thermal results, indicate that there is a rapid increase in fine material up to 12 hours, but that after this loose aggregates are formed. The physical disruption is probably accompanied by chemical decomposition, but both these processes cease at 600 hours and the loose aggregates give progressively more stable aggregates. R. C. M.

**Mackenzie (R. C.) & Milne (A. A.).** *The effect of grinding on micas.* Clay Min. Bull., 1953, **2**, 57–62.

A biotite–hydrobiotite mixture and a vermiculite sample ground in an agate mortar for periods up to 24 hours were subjected to X-ray, differential thermal, and cation-exchange examination. The effects observed originate mainly from mechanical causes, so differing from muscovite [M.A. **12**–290]. The relative stability of the minerals to grinding is attributed to interlayer water. B. D. M.

**Mitchell (W. A.).** *Oriented aggregate specimens of clay X-ray analysis made by pressure.* Clay Min. Bu 1953, **2**, 76–78.

Excellent orientation may be obtained by dry press of the powdered clay by hand in a specially-construc die with detachable base-plate. R. C. M

**Hénin (S.) & Robichet (O.).** *A study of the synthesis of minerals.* Clay Min. Bull., 1954, **2**, 110–115.

Very dilute solutions boiled gently for periods of weeks give crystalline clay minerals. Above pH magnesian smectite was detected by X-ray and o methods; below this pH the minerals formed were definitely identified. Over a wide range of solution c position the $SiO_2$:MgO ratio in the solid is const Micas and antigorites may also form under suit conditions. R. C. T

**Mitchell (B. D.) & Mackenzie (R. C.).** *The removal of iron oxide from clays.* Clay Min. Bull., 1954, **2**, 115–

A summary is given of a hydrosulphite (dithio method published in full elsewhere (Soil Sci., 1954 173–184). Small changes (generally reductions) in cation-exchange capacities of soil clays and pure minerals occur on treatment. It is suggested that no u breakdown of the clay minerals takes place. W. A.

**Phelps (G. W.) & Maguire (S. G.).** *Practical particle-size analysis of clays : I, sample preparation.* Journ. Amer. Ceram. Soc., 1957, **40**, 399–402, 6 figs.

Wide variations in particle-size data from different laboratories for the same clay are thought to be caused by dissimilar preparatory techniques. Sodium polyphosphate salts are recommended as standard deflocculants. The amount necessary may be determined by an electrolyte-acidity curve. P. K. H.

**Parker (Carol J.), Hathaway (John C.), & Blackmon (Paul D.).** *Some curves from a portable differential thermal analysis unit.* Bull. U.S. Geol. Surv., 1956, no. **1021–G**, 237–251, 9 figs., 1 pl.

A portable unit of a type previously described [M.A. 10–482] was used to obtain d.t.a. curves for some standard clay minerals and other minerals commonly associated with clays. Minerals for which curves are figured are kaolinite, halloysite, dickite, montmorillonite, nontronite, illite, bentonite, pyrophyllite, bauxite, gibbsite, attapulgite, sepiolite, boehmite, diaspore, brucite, chlorite, vermiculite, muscovite, phlogopite, talc, quartz, calcite, dolomite, siderite, and goethite : details are given of localities and any impurities present. R. A. H.

**Grimshaw (R. W.).** *The quantitative estimation of silica minerals.* Clay Min. Bull., 1953, **2**, 2–7.

The inversions of the silica minerals are discussed, and it is shown that for quartz the peak height on the differential thermal cooling curve is directly proportional to the amount present. Low quartz contents for quartzites, etc., are explained on the basis of the presence of amorphous material. Quantitative determination of cristobalite and tridymite are not possible because the characteristics of the curve vary from sample to sample. R. C. M.

**Greene-Kelly (R.).** *Interpretation of D.T.A. diagrams : the low-temperature endothermic peak.* Clay Min. Bull., 1953, **2**, 79–85.

Isobaric dehydration-rehydration and differential thermal curves for Li-montmorillonite and Li-hectorite, together with carefully controlled sorption and X-ray measurements on Na-montmorillonite lead to the conclusion that the configuration of the low-temperature peak system is a function of the diffusion coefficient or mobility of the sorbed water. This, however, does not preclude the less mobile water being coordinated round the cations. R. C. M.

**Greene-Kelly (R.).** *Irreversible dehydration in montmorillonite. Part II.* Clay Min. Bull., 1953, **2**, 52–56.

Montmorillonite is the only member of its group not to expand with glycerol after Li-saturation and heating to 200°C. Glycerol treatment of samples of montmorillonite saturated with various cations and heated shows that Mg-montmorillonite behaves as Li-montmorillonite, but that the others do not collapse irreversibly until at least 430°C. This is in agreement with the hypothesis that small ions may migrate into vacant holes in the octahedral sheet. A specific test for montmorillonite is derived. R. C. M.

## Properties and Structure

**Antun (Paul).** *Sur une palygorskite d'Åna-Sira (Norvège du Sud).* Norsk Geol. Tidsskrift, 1956, **36**, 49–52, 1 fig.

Palygorskite occurs as sheets of mountain leather in joints in the anorthosite of Åna-Sira, southern Norway. It is found in thin white fibrous strips, with $\alpha$ 1·524, $\gamma$ 1·532, $2V\alpha \approx 60°$, $\gamma \parallel$ elongation. The d.t.a. curve is shown, and is compared with that given by attapulgite from Quincy, Florida : the term attapulgite is synonymous with palygorskite. Chemical analysis of the Åna-Sira material gave $SiO_2$ 56·30, $TiO_2$ nil, $Al_2O_3$ 12·58, $Fe_2O_3$ 0·43, MnO tr., MgO 9·66, CaO 0·19, $H_2O+$ 12·19, $H_2O-$ 8·98,= 100·33, giving a formula of $MgAlSi_4O_{10}(OH).4{\cdot}4H_2O$. [M.M. **30**–471, 534 ; M.A. **8**–81, **11**–173, 216] R. A. H.

**Caillère (S.) & Hénin (S.).** *Sur la présence à Diélette d'une saponite à texture fibreuse.* Bull. Soc. franç. Min. Crist., 1957, **80**, 543–545.

Saponite was found as a vein two cm. thick in the Diélette iron mine. The X-ray diagram of this material showed a less fibrous character than previously described Scottish saponites [Hénin, Esquevin & Caillère, 1954, Bull. Soc. franç. Min. Crist., **77**, 491] : this was attributed to the additional presence of calcite. The analysis of purified material gave $SiO_2$ 43·60, $Al_2O_3$ 8·20, $Fe_2O_3$ 3·70, FeO 4·80, CaO 2·70, MgO 20, $H_2O\pm$17,=100·00. R. A. H.

**Lerbekmo (J. F. ).** *Authigenic montmorillonoid cement in andesitic sandstones of Central California.* Journ. Sed. Petr., 1957, **27**, 298–305.

The smectite cement (probably intermediate between nontronite and beidellite) has been identified as coatings on the grains in blue Upper Tertiary andesitic sandstones by optical, X-ray, and differential thermal methods.

Partial chemical analysis gave $Fe_2O_3$ 10–15, MgO < 1%. The smectite probably formed at low temperatures from free pore solutions derived from dissolution by slowly migrating waters of crypto-crystalline and glassy fragments of intermediate volcanic rock. Occurrence of cement is independent of environment of deposition. R. C. M.

**MacEwan (D. M. C.).** *'Cardenite', a trioctahedral montmorillonoid derived from biotite.* Clay Min. Bull., 1954, **2**, 120–126.

Flakes of a 'weathered biotite' separated from the sand fraction of a soil from Carden Wood, Aberdeenshire, had a cation-exchange capacity of 91 me./100g., were biaxial with strong birefringence, had 2V fairly small and negative, refr. ind. [$\gamma$] 1·598. The mineral was shown by X-rays to be a smectite, the apparent single crystals being orientated aggregates. The composition was $SiO_2$ 39·00, $TiO_2$ 0·03, $Al_2O_3$ 15·54, $Fe_2O_3$ 11·46, FeO 2·33, CaO 1·36, MgO 12·76, MnO 0·21, $Na_2O$ 0·68, $K_2O$ 0·29, ign. loss 17·33, = 100·99, giving the formula $0{\cdot}40M^{+}$ $(Si_{6\cdot17}Al_{1\cdot83})$ $(Al_{0\cdot89}Fe^{3+}_{1\cdot37}Fe^{2+}_{0\cdot30}Mg_{3\cdot00}Ca_{0\cdot24})O_{20}(OH)_4$. A one-dimensional Fourier synthesis was performed for the glycerol-saturated material. [M.M., **29**–72.] R. C. M.

**Robertson (R. H. S.) & Twedily (A. E.).** *The biogeochemistry of Skye diatomite.* Clay Min. Bull., 1953, **2**, 7–16.

A material giving no X-ray pattern and showing only a hygroscopic moisture peak on the differential thermal curve is present to the extent of 30–50% in Skye diatomite. Two analyses gave:

| | $SiO_2$ | $Al_2O_3$ | $Fe_2O_3$ | CaO | MgO | $Na_2O$ | $H_2O+$ | Total |
|---|---|---|---|---|---|---|---|---|
| A | 58·2 | 11·5 | 7·5 | 4·1 | 3·4 | 0·9 | 14·3 | 99·9 |
| B | 58·5 | 11·5 | 7·7 | 3·4 | 3·8 | 0·9 | 14·3 | 100.1 |

with cation-exchange capacities of 75 and 98 me./100g., respectively. This gel apparently consists of a slime of unwanted elements exuded by the living diatoms.

R. C. M.

**Brown (G.).** *The dioctahedral analogue of vermiculite.* Clay Min. Bull., 1953, **2**, 64–70.

A mineral in a soil profile from Lancashire, where it occurs along with a mica and a kandite, shows a 14Å spacing which remains unchanged on glycerol treatment but drops to 11·8Å on heating to 440°C. Treatment with $NH_4NO_3$ or with KOH + KCl enhances the intensity of the 10Å reflection relative to that of the 14Å. The 060 reflection is at 1·499Å. The mineral thus appears to be dioctahedral vermiculite. R. C. M.

**[Konta (Irzhi)]** Конта (Иржи). Триоктаэдрический илл из Темплштейна в западной Моравии («парасепиоли Ферсман.) [*Trioctahedral illite from Templstein Western Moravia (the 'parasepiolite' of Fersman* Изв. Акад. Наук СССР, Сер. Геол. [Bull. Acad. S URSS, Sér. Géol.], 1956, **11**, 109–113, 4 figs.

This mineral was shown by optical, chemical, X-ra and thermal methods to be trioctahedral illite. It occu in columnar aggregates with positive elongation, $\gamma-\alpha$ 0·0 $\alpha$ 1·526 ± 0·002, $\gamma$ 1·545 ± 0·002. It does not swell water. The analysis of F. Kovàř (1902) gave $SiO_2$ 52·7 $Al_2O_3$ 2·51, $Fe_2O_3$ 1·15, MgO 22·89, CaO 0·81, MnO 0·6 $CO_2$ tr., $H_2O+110°C$ 10·71, $H_2O-110°C$ 8·49, = 99·9 The X-ray diffraction pattern is consistent with trioctahedi illite, as is the differential thermal curve, which sho endothermic peaks at 140°C and 860°C, the former bei much smaller than the comparable peak on saponite [M. **13**–148]. Shadowed electron micrographs are also show R. C. M.

**Mathieson (A. McL.).** *Mg-vermiculite: a refinement a re-examination of the crystal structure of the* 14·36 *phase.* Amer. Min., 1958, **43**, 216–227, 5 figs., 3 tabl

Using available diffraction data a differential Four synthesis has been made, refining the crystal structure the 14·36 Å phase of Mg-vermiculite. Earlier gene conclusions have not been changed, but new data indica in the interlamellar region that either water molecules a vibrating asymmetrically or that there is a regular displa ment of water sites from the hexagonal position. Althou evidence is not decisive the latter alternative is favour by the experimental values of the temperature facto Comparison with the chlorite structure supports t displacement concept, due to the incomplete occupati of water molecule sites in Mg-vermiculite. B. H. B

**Hosking (J. S.).** *The clay minerals.* Second Austr Conf. Soil Sci., 1957, **1**, pt. 1, 6–1—6–26, 5 tabl 1 fig.

A concise and up-to-date review of the structure, comp sition, and family and group relationships of the c minerals; 14 refs. R. C. M

**Hofmann (U.).** *Neue Ergebnisse über Silikate Schichtstruktur.* Silikattechnik, 1957, **8**, 224–230.

A review of the structures of the clay minerals, w special reference to order and disorder in kaolinite,

lowed by a consideration of the effects of exchangeable
ns on clay properties. Thixotropy and the effect of
ctrolytes on the fluidity of ceramic masses is discussed.
R. C. M.

**nst (Th.), Forkel (W.), & von Gehlen (K.).** *Zur Nomenklatur und Systematik der Tone.* Ber. dtsch. keram. Ges., 1958, **35**, 53–56.

Several possible methods of so naming natural clays as indicate their composition are considered and a somewhat complicated system of designating clay composition developed. Thus, **K** indicates kandite, **M** smectite, etc., th suffixes $_{1, 2, 3}$ . . . to denote individual minerals. gures preceding the formula give mean particle size and rface area. As an example, $2{\cdot}5/6{\cdot}0\mathbf{K}_2(45)\mathbf{Q}_1(45)\mathbf{G}_4(3)\text{–}\mathbf{H}_3(2)$ dicates a clay with half the particles above and half below $5\mu$ in size, a surface area of 6 sq.m/g, *ca* 45% kaolinite M ("fireclay mineral"), 45% quartz, *ca* 3% illite, and th a heavy mineral content of *ca* 2%. R. C. M.

**hofield (R. K.) & Samson (H. R.).** *The deflocculation of kaolinite suspensions and the accompanying change-over from positive to negative chloride adsorption.* Clay Min. Bull., 1953, **2**, 45–51.

The cation-exchange capacity of kaolinite may not be tirely due to broken bonds. Suspensions of kaolinite dilute NaCl solutions show decreasing positive sorption $Cl^-$ as the pH increases to about 9; above this pH gative sorption rapidly attains its maximum. Certain arges on the particle thus change from positive to gative with increasing alkalinity. Small amounts of egative) montmorillonite sorbed on the (positive) kaolinite rface may be separated off by increasing the alkalinity.
R. C. M.

**ofmann (U.), Fahn (R.), & Weiss (A.).** *Thixotropie bei Kaolinit und innerkristalline Quellung bei Montmorillonit.* Kolloid-Zeits., 1957, **151**, 97–115.

The volume of liquid in equally quickly-setting thixotropic ls, and the sedimentation volume, of Li, Na, K, Mg, Ca, d Ba kaolinite and montmorillonite samples were deterined in organic liquids and in aqueous solutions; the terlayer distance in the montmorillonite samples was also termined by X-ray examination. The highest values for ixotropic and sedimentation volumes with kaolinite were tained with liquids which gave the smallest interlayer distances with montmorillonite, and which wet the solids only with difficulty. The structure of the thixotropic gels and factors determining thixotropy in aqueous electrolyte solutions are discussed. R. C. M.

**Hofmann (U.), Fahn (R.), & Weiss (A.).** *Thixotropy and intracrystalline swelling.* Clay Min. Bull., 1953, **2**, 70–76.

A brief outline of published work of the authors. The results obtained by freeze-drying clay gels are noted. In discussion D. M. C. MacEwan considers theoretically the forces between clay particles. R. C. M.

**Brindley (G. W.) & Nakahira (M.).** *Kinetics of dehydroxylation of kaolinite and halloysite.* Journ. Amer. Ceram. Soc., 1957, **40**, 346–350, 7 figs.

Isothermal weight loss measurements show that the dehydroxylation of fine-grained kaolinite and halloysite follows an exponential curve, whereas coarse-grained clay follows a sigmoidal curve. Activation energies of 65 and 55 kcal per mole are deduced for kaolinite and halloysite respectively. The sensitivity of the dehydroxylation reaction to low water-vapour pressures is discussed.
P. K. H.

**Amphlett (C. B.).** *Ion exchange in clay minerals.* Endeavour, 1958, **17**, 149–155, 5 figs.

Following a review of the mechanism of ion exchange in clays, recent applications are described in which clay minerals have been used in connection with the disposal of radioactive wastes. Ground storage in selected areas may be used for low-activity effluents, while highly active waste may be absorbed by clays and then fixed against leaching by firing to 1000°C. R. A. H.

**Cowan (C. T.) & White (D.).** *The mechanism of exchange reactions occurring between sodium montmorillonite and various n-primary aliphatic amine salts.* Trans. Faraday Soc., 1958, **54**, 691–697.

A study was made of the cation-exchange reaction between montmorillonite and various amines and amine salts. Although the adsorption/desorption appears to be related directly to amine size, it is considered that the adsorptive effect due to van der Waals' forces is the operative factor: the magnitude of these forces is, however, directly related to molecular size. The specially

purified montmorillonite gave a structural formula after analysis of—

$$(Si_{7\cdot645}Al_{0\cdot355})^{IV}\ (Al_{2\cdot923}Fe_{0\cdot214}Mg_{0\cdot860})^{VI}\ (OH)_4O_{20}\cdot Na_{1\cdot215}$$

R. A. H.

## Petrology

**Hosking (J. S.).** *Clay mineralogy and parent material.* Second Austral. Conf. Soil Sci., 1957, **1**, pt. 1, paper 7, 1–8, 2 tables, 3 figs.

The true parent materials of soils are usually not rocks but weathered products lying on these rocks. The clay mineralogy of these deposits depends upon the composition of the rocks and the types of weathering undergone. Acid rocks give mainly kandites, basic rocks smectites under wet conditions or kandites under strong leaching conditions. Micas may be formed or may be inherited from the rock. Chlorites, vermiculites, etc., may be found in material derived from rocks containing micas, chlorites and related minerals. Soil-forming processes may modify the minerals in the surface layers. Examples are quoted. R. C. M.

**Steiner (A).** *Hydrothermal rock alteration at Wairakei, New Zealand.* Econ. Geol., 1953, **48**, 1–13, 4 figs.

Drilling at Wairakei for steam for power purposes shows that flat-lying tuffaceous and arenaceous beds, but not the interbedded argillaceous rocks, have been altered hydrothermally. Four zones of progressive alteration are distinguished. A superficial zone of sulphuric acid leaching is marked by kaolinite, alunite, and opal. Below this is a zone of argillization characterized by clay minerals of the montmorillonite group. Superimposed on the argillized zone is a zone of zeolitization, characterized by development of mordenite, at shallow depths and a zone of feldspathization, characterized by the presence of adularia, at deeper levels. The drill-holes have apparently not penetrated the zone of primary acid leaching, which is expected to occur below the zone of feldspathization. Temperatures at which the adularia, mordenite, and the montmorillonite-like minerals form are given, and the chemical character of the environment during the formation of these minerals is elucidated. W. A. W.

**Sudo (T.).** *Clay mineralogical aspects of the alteration of volcanic glass in Japan.* Clay Min. Bull., 1954, **2**, 96–106.

X-ray, differential thermal, and electron-optical meth show that the kanditic clays derived from pumice or are composed largely of hydrated halloysite with alloph or montmorillonite or both. Allophane predominates at surface and halloysite at depth. Smectitic clays are found. The factors operative in the formation of minerals are pH, chemical composition of source r temperature, pressure, degree of leaching, and geolog time. The minerals formed under different combination these are considered. R. C. M

**Rolfe (B. N.) & Jeffries (C. D.).** *Mica weathering in soils in Central New York, U.S.A.* Clay Min. B 1953, **2**, 85–94.

Clays derived from greywacke under different pedog conditions were examined by X-ray methods using glyc treatment and Mg– and K–saturation. The primary ef of weathering is removal of $K^+$ from the mica. sequence unweathered mica → mica intermediate hydrated mica (vermiculite) is postulated, but there is s doubt as to the position of chlorite. Impeded drai results in reduced weathering. R. C. M

**Moum (J.) & Rosenqvist (I. Th.).** *Kjemisk bergartsforvi belyst ved en del leirprofiler.* Norsk Geol. Tids 1954–5, **34**, 167–174, 1 fig.

The adsorbed cations through some clay profile eastern Norway have proved that weathering of potassium-bearing minerals has taken place *in sit* post-glacial time, and is specially high in the upper metres. It is inferred that the solid rocks may und similar weathering although the water content and por are much lower. (Authors' abstract.) F.

**Rosenqvist (Ivan Th.).** *Montmorillonitt fra Fortun i Montmorillonite from Fortun in Sogn, West No* Norsk Geol. Tidsskr., 1957, **37**, 403–414, 5 figs.

A highly plastic montmorillonitic breccia rock Fortun in Sogn is studied by X-ray and chemical met The X-ray diagrams show a remarkably strong reflexion and asymmetric *hk*-bands. The montmoril is considered dioctahedral. The ion-exchange capac found to be 128 me./100 g. Probably the rock origi from anorthositic inclusions below the upper Jotun plane by hydrothermal alteration. I. W

**roste** (**John B.**) & **Tharin** (**James C.**). *Alteration of clay minerals in Illinoian till by weathering.* Bull. Geol. Soc. America, 1958, **69**, 61–68, 2 figs.

The clay minerals of closely spaced samples throughout weathering profile in Illinoian till of northwestern ennsylvania were investigated by X-ray techniques. hlorite in the fresh till is degraded by hydration of the rucite sheets, so that vermiculite develops in the upper oil zone. Well-crystallized illite of the fresh till is degraded y hydration of the intermica sheets to produce a random ixed layering of illite and montmorillonite. The clay ineral alteration is essentially the same for weathering rofiles developed on tills of Illinoian and Wisconsin age espite different thicknesses, different degree of structural nd textural development, and different degree of mottling n the soil zones. A. L. A.

**chultz** (**Leonard G.**). *Petrology of underclays.* Bull. Geol. Soc. America, 1958, **69**, 363–402, 14 figs.

The clay mineralogy of each of 10 Pennsylvania underclay ones from the Appalachian, Illinois, and Mid-Continent asins is shown graphically on separate maps. The under-lays are composed principally of poorly crystallized aolinite, illite, mixed-layer illite-montmorillonite, quartz, nd in many places a 14Å mineral whose properties range rom vermiculite to chlorite. The shales above coal zones ontain less kaolinite and mixed-layer clay and more and etter crystallized 14Å clay than do the underclays ; shales nd other rocks from below the coal are more like the nderclays. Underclays from the central parts of the asins also contain less kaolinite and mixed-layer clay and more and better crystallized 14Å clay than those from the margins of basins. The mineralogy of the underclays is thought to have been little altered since deposition. The distinctive mineralogical features of underclays such as high kaolinite or mixed-layer clay content or both are thought to have resulted from soil formation in the source areas, and regional and stratigraphic variations in the mineralogy of underclays to have resulted from different lengths of time and types of weathering in the various source areas.

A. L. A.

**Rosenqvist** (**I. Th.**). *Bidrag til Østlandsleirenes petrografi.* [*Contribution to the petrology of the clays of Eastern Norway.*] Norsk Geol. Tidsskr., 1955, **35**, 105–116, 5 figs. (Engl. summary.)

The clay minerals of the Quaternary clays of Eastern Norway are found to belong mainly to the hydrous mica group. Montmorillonite is usually scarce. Montmorillonite found in the upper (dry) crust of clay deposits appears to have been formed from chlorite minerals by specific weathering processes, which have also given rise to appreciable enrichments in adsorbed nickel. It is concluded that these clays are being continuously chemically altered.

I. W. O.

**Hagemann** (**F.**) & **Spejldnaes** (**N.**). *The Middle Ordovician of the Oslo Region, Norway.* 6. *Notes on bentonites* (*K-bentonites*) *from the Oslo-Asker district.* Norsk Geol. Tidsskr., 1955, **35**, 29–51, 10 figs.

A series of bentonite beds occurring in stage 4b, Caradoc, at Sinsen and other localities in the Oslo-Asker district are described. It is assumed that the bentonites from Sinsen probably contain 3 different types of mixed layered minerals. Most of them have a rather high content of potassium (*ca* 7·5% $K_2O$). Correlation with the Middle Ordovician of Central and S.E. Sweden indicates that the sequence is more complete in the Oslo Region. Fd. H.

**Hagemann** (**Fredrik**). *On the petrography of the Silurian shales from Hadeland, Norway.* Norsk Geol. Tidsskr., 1957, **37**, 229–246, 4 figs., 5 pl.

By means of microscope, X-ray, and D.T.A., constituents of the Silurian shales from Hadeland are determined to be quartz, calcite, mica, chlorite, and illite. Some chemical data are given, together with suggestions concerning the low phosphorus and the high Mn and Mg content of the same shales. The problem of red colour in shales from stage 7c is discussed briefly, as is an occurrence of speckled shale in the same stage. I. W. O.

**Preusse** (**Hans-Ulrich**). *Untersuchungen über die Tonkolloide verschiedener hessischer Böden.* Notizbl. hess. Landesamt. Bodenforsch., 1957, **85**, 334—379, 26 tables, 6 figs.

Nine profiles (developed on granite, diorite, basalt, and various sedimentary rocks) are described. Chemical analyses of parent rock, −2 mm. soil, silt, and clay show that, while the clay fraction is poorer in $SiO_2$ and richer in sesquioxides than the rock, no simple relationship could be established between the −2 mm. soil and the rock. Other chemical relationships are discussed. In the clay fractions, illite was predominant in all profiles, montmorillonite was present only in the basalt profile, and kaolinite was present

only in small amounts, the percentage always being higher in the surface layers than in the lower horizons. Allophane may also be present. R. C. M.

[**Shabaeva** (**E. A.**) & **Gorbunova** (**L. I.**)] Шабаева (Е. А.) и Горбунова (Л. И.). Случай замещения монтмориллонита гидрослюдой в глинах среднекаменноугольных отложений Саратовского Поволжья. [*A case of montmorillonite replacement by hydromica in the clays of the Middle Carboniferous deposits in the Saratov–Volga region.*] Доклады Акад. Наук СССР [C.R. Acad. Sci. URSS], 1957, **116**, 484–487,1 pl., 3 figs.

Combined chemical, X-ray, thermal, and electron microscope studies show that the original montmorillonite in clays is partly replaced by hydromica. The replacement is attributed to diagenesis. S. I. T.

### Applied

**Brown** (**L. G.**). *Geological aspects of the St. Austell granite.* Clay Min. Bull., 1953, **2**, 17–21.

A review of the geology and mineralogy of the St. Austell china clay deposits. Technical aspects are also briefly considered. R. C. M.

**Holdridge** (**D. A.**) & **Moore** (**F.**). *The significance of clay–water relationships in ceramics.* Clay Min. Bull., 1953, **2**, 26–33.

A review. The mineralogical constitution of ceramic clays, the relationship between water sorption and ion exchange, dehydration curves, plasticity changes on heating, the effect of moisture content on strength, and the rheology of the clay–water system are all discussed. R. C. M.

**Albareda** (**J. M.**), **Aleixandre** (**V.**), & **Fernandez** (**T.**). *Influe of the mineralogical composition of clays and of excha cations on the catalytic oxidation of ethyl alcohol in vapour phase.* Clay Min. Bull., 1954, **2**, 107–110.

Optimum temperature, rate of flow, alcohol : oxyg ratio, etc., for production of aldehyde from alcohol usi acid-activated kaolin and bentonite, and bentonite sat ated with $Ag^{+}$, $Cu^{2+}$, $Ca^{2+}$, $Zn^{2+}$, $Co^{2+}$, and $Cr^{2+}$ are co sidered. Ag- and Cu-bentonite appear to act as dehyd genants of the alcohol; the other cations tested do increase the activity. R. C. M.

**Lehmann** (**H.**). *Soluble and deleterious salts in raw materi containing clay minerals.* Clay Min. Bull., 1954, 119–120.

Methods of determining soluble salts in clayey r materials and in fired products are discussed. Effl escence depends upon pore characteristics as well as total soluble salts and a simple efflorescence test for t fired product is described. R. C. M.

**Langston** (**Robert B.**), **Trask** (**Parker D.**), & **Pask** (**Joseph A**) *Effect of mineral composition on strength of centr California sediments.* Calif. Journ. Mines & Ge 1958, **54**, 215–235.

The clay mineral content of sediments from three bo holes near San Francisco was high in illite, moderately hi in montmorillonite, low in chlorite, and low in kaolini Samples containing much montmorillonite have a grea shear strength than those containing less montmorillon when the water content is comparable. Samples contain much illite are relatively weak. The plasticity ind varies with the montmorillonite content, this index be high when much montmorillonite is in the sample. K. S

## CRYSTAL STRUCTURE OF MINERALS

**Simon** (**Ivan**). *Structure of neutron-irradiated quartz and vitreous silica.* Journ. Amer. Ceram. Soc., 1957, **40**, 150–153, 4 figs.

Quartz and vitreous silica are disordered by heavy irradiation ($10^{20}$ neutrons per $cm^2$). X-ray diffraction and infrared spectra show that the structure of the quartz becomes almost identical with that of vitreous silica. The average Si–O distance (1·61Å) is unchanged, but the Si–O–Si bond angle decreases from 142° to 138°. The radial distances of the more distant neighbor atoms show a wider distribution in the disordered material. This profound rearrangement results if every knocked-on atom produ disordering in a region containing about 5300 surround silicon atoms. P. K. H

**Dornberger-Schiff** (**K.**). *On order–disorder structures (O structures).* Acta Cryst., 1956, **9**, 593–601.

A systematization of structures with stacking disor Examples are given of each category, together with account of the diffraction phenomena. A nomenclature plane space groups in three dimensions is also suggest P. G

**ighton (Beryl M.).** *Order–disorder structures in amesite.* Acta Cryst., 1957, **10**, 692–694, 3 figs.

Layers of amesite composition may be stacked with rious rotational and translational relationships to one other. These are expressed as vectors in terms of which ordered and ordered structures are discussed [M.A. –99, **14**–24]. J. Z.

**nith (J. V.) & Sahama (Th. G.).** *Order–disorder in kalsilite.* Amer. Min., 1957, **42**, 287–288.

Relatively large crystals of kalsilite from lava at Kabfumu, iragongo area, North Kivu, Belgian Congo, have given ngle crystal X-ray photographs with additional diffuse flections indicating that a new unit cell must be taken at ° to the usual 5Å cell, thus increasing the *a* repeat stance by $\sqrt{3}$ : the *c* axis is unchanged and the symmetry mains hexagonal, a possible space group being $P6_32$. The ensity of the diffuse reflections varies between crystals, d decreases to zero on heating at 600°C. for 3 days. It considered that the diffuse reflections are caused by the dering of Si and Al atoms : the prefixes *d-* and *o-* are ggested for the disordered (*a* 5·15Å) and ordered (*a* 8·9Å) ms of kalsilite. [M.M. **26**–197, 218 ; M.A. **10**–337, **12**–372] R. A. H.

**nha (K. P.) & Sinha (A. P. B.).** *Vacancy distribution and bonding in some oxides of spinel structure.* Journ. Physical Chem., 1957, **61**, 758–761.

The nature of the vacancy distribution in the defect inel-type oxides $\gamma$-$Fe_2O_3$, $\gamma$-$Mn_2O_3$, $\gamma$-$Cr_2O_3$, and $\gamma$-$Al_2O_3$ discussed and it is concluded that all vacancies lie in tahedral sites, their distribution being ordered in $Fe_2O_3$, but random in the case of the other oxides. R. A. H.

**rrer (R. M.), Bultitude (F. W.), & Sutherland (J. W.).** *Structure of faujasite and properties of its inclusion complexes with hydrocarbons.* Trans. Faraday Soc., 1957, **53**, 1111–1123, 5 figs.

Synthetic crystals of faujasite used in this investigation ve the space group $Fd3m$–$O_h7$ with $a \approx 24{\cdot}94$Å, compared th natural material from Sasbach, in the Kaiserstuhl, ich has $a \approx 24{\cdot}65$Å. The Al and Si atoms form a lattice which three types of polyhedral structural units can be tinguished : these are cubo-octahedral aluminosilicate ges of the type found in sodalite, polyhedra formed by king two parallel six-membered rings by six oxygen dges, and additional very large cavities or " super-cages " formed by a framework of four of the eight six-membered rings in any one cubo-octahedron. The openness of the structure is associated with the channel system passing through the super-cages, their free diameter being 12–13Å. The occlusion of benzene, toluene, cyclopentane within these channels has been studied in detail. R. A. H.

**Smith (F. G.) & Hill (V. G.).** *On the reported inversion of hexagonal to cubic zinc sulphide by grinding.* Acta Cryst., 1956, **9**, 821–822.

Impact grinding of zinc sulphide randomizes the structure by deformation faulting and this is independent of the starting material (cubic or hexagonal), a similar product being obtained. P. G.

**Dent (L. S.) & Taylor (H. F. W.).** *The dehydration of xonotlite.* Acta. Cryst., 1956, **9**, 1002–1004.

Dehydration of xonotlite, $Ca_6Si_6O_{17}(OH)_2$, at 775—800°C causes oriented transformation to $\beta$-$CaSiO_3$. The mechanism of the change is discussed. P. G.

**Brunton (George), Steinfink (H.), & Beck (Carl W.).** *The crystal structure of callaghanite, $Cu_8Mg_8(CO_3)_4(OH)_{24}\cdot 8H_2O$.* Acta Cryst., 1958, **11**, 169–174, 4 figs.

Callaghanite is monoclinic, $C2/c$, with *a* 10·06, *b* 11·80, *c* 8·24Å, $\beta$ 107° 18′, $Z=4$, *D* calc. 2·65 g/cc. The structure is fully described. The copper atom is coordinated by a distorted pyramid of five oxygens, of which four are in (OH) groups and one is in a water molecule. The planar carbonate group, which is parallel to (001), is bonded to magnesium atoms, and by hydrogen bonds to the water molecules. Magnesium atoms are in octahedra of oxygens which form chains perpendicular to *b* and these chains are connected by carbonate groups and paired copper pyramids. [M.M.**30**–729 ; M.A. **12**–304, 410] J. Z.

**Gabrielson (O.).** *The crystal structure of finnemanite $Pb_5Cl(AsO_3)_3$.* Arkiv Min. Geol. Stockholm, 1955, **2**, 1–8, 1 fig.

Finnemanite from the type area at Långban [M.A. **2**–147] has *a* 10·28 and *c* 7·00Å [M.A. **2**–528], space group is $P6_3$, two molecules $Pb_5Cl(AsO_3)_3$ in the unit cell. The lead atoms occupy three different positions : Pb*I* are surrounded by oxygen atoms in a regular octahedral configuration, Pb*II* by six oxygen atoms and two chlorine atoms in the same configuration and Pb*III* by three oxygen and one chlorine atom forming a distorted tetrahedron. The

oxygen (and chlorine) octa- and tetrahedra are linked together through three coordinated arsenic atoms forming Pb–O–As chains in the direction of the *c*-axis. There is no structural relationship between finnemanite and mimetite. E. W.

**Henriques (Å.).** *Cell dimensions of sphalerite.* Arkiv Min. Geol. Stockholm, 1957, **2**, 275–278, 1 fig.

The unit cell lengths of 5 sphalerites with varying iron content range from 5·409 to 5·416±0·002Å. Analyses of the 5 specimens are given. Comparison with previous results by Kullerud and by Chudoba & Mackowsky [M.A. **7**–385] are made and differences discussed. E. W.

**Geller (S.) & Wood (E. A.).** *Crystallographic studies of perovskite-like compounds. I. Rare earth orthoferrites and $YFeO_3$, $YCrO_3$, $YAlO_3$.* Acta Cryst., 1956, **9**, 563–568.

The orthoferrites of Gd, Eu, Sm, Nd, Pr, La and Y and the compounds $YCrO_3$ and $YAlO_3$ are isostructural, with space group *Pbnm* and four distorted perovskite units in the true cell. X-ray and morphological data on these crystals are discussed. P. G.

**Geller (S.) & Bala (V. B.).** *Crystallographic studies of perovskite-like compounds. II. Rare earth aluminates.* Acta Cryst., 1956, **9**, 1019–1025, 2 figs.

The aluminates of Gd, Eu, Sm are isostructural with $GdFeO_3$ and belong to the space group $D_{2h}^{16}$-*Pbnm* with four distorted perovskite units in the true cell. The aluminates of Nd, Pr, and La are rhombohedral with space group $D_{3d}^{5}$—$R\bar{3}m$, with two formula units in the cell. $LaAlO_3$ undergoes a transition at 435±25°C. to the cubic cell with one formula unit. J. Ph.

**Gilleo (M. A.).** *Crystallographic studies of perovskite-like compounds. III. $La(M_x,Mn_{1-x})O_3$ with $M=Co$, Fe, and Cr.* Acta Cryst., 1957, **10**, 161–166, 2 figs. J. Z.

**Geller (S.).** *Crystallographic studies of perovskite-like compounds. IV. Rare earth scandates, vanadites, galliates, orthochromites.* Acta Cryst., 1957, **10**, 243–248.

The compounds of formula $ABO_3$, with trivalent rare-earth $A$ ions and trivalent $B$ ions, are mostly isostructural with $GaFeO_3$, which is orthorhombic (***Pbnm***) and has four distorted perovskite units in the unit cell. Optical and d.t.a. studies and high temperature X-ray powder photography show that the orthorhombic structure may tra form to a rhombohedral and the rhombohedral to the cu ideal perovskite structure. Results of previous investi tions are discussed [see previous abstracts]. J. Z

**Geller (S.).** *Crystallographic studies of perovskite-like co pounds. V. Relative ionic sizes.* Acta Cryst., 19 **10**, 248–251.

Sets of relative ionic radii are derived for cryst previously investigated [see previous abstracts]. T differences between these and the radii given by Pauli Goldschmidt, and others cannot be explained in a systematic manner. J. Z

**Kay (H. F.) & Bailey (P. C.).** *Structure and properties $CaTiO_3$.* Acta Cryst., 1957, **10**, 219–226, 5 figs.

Powder photographs of synthetic $CaTiO_3$ were ident with those from one group of natural perovskite specim and yielded accurate parameters *a* 5·3670, *b* 7·64 *c* 5·4439Å (all ±·0001). Single crystals of perovskite w used to study twinning relationships and to determine space group (*Pcmn*, $Z = 4$) and structure. The effect heating on twinning and symmetry was observed over range −200°C to 900°C. [M.M. **15**–156; M.A. **7**–; **9**–101, **10**–20, 213] J. Z

**Kay (H. F.) & Miles (J. L.).** *The structure of cadm titanate and sodium tantalate.* Acta Cryst., 1957, 213–218, 2 figs.

Crystals grown from solution were found to hav distorted perovskite-type structure. Both are orthorhom $Pc2_1n$, $Z=4$, with cell dimensions *a* 5·348, *b* 7·615, *c* 5·4 and *a* 5·4941, *b* 7·7508, *c* 5·513Å, respectively. Discus of bonding and properties will follow in a later paper. J.

**Grønvold (Fredrik) & Røst (Erling).** *The crystal stru of $PdSe_2$ and $PdS_2$.* Acta Cryst., 1957, **10**, 329– 1 fig.

$PdSe_2$ and $PdS_2$ are orthorhombic *Pbca* with *a* 5 *b* 5·866, *c* 7·691Å and *a* 5·460, *b* 5·541, *c* 7·531Å respecti Each Pd atom is surrounded by four Se (S) atoms at corners of a square, and the metalloid atoms are bo in pairs. The structure may be regarded as a defo pyrite-type structure. J.

**ur (W. H.).** *Über die Verfeinerung der Kristallstrukturbestimmung einiger Vertreter des Rutiltypus : $TiO_2$, $SnO_2$, $GeO_2$ und $MgF_2$.* Acta Cryst., 1956, **9**, 515–520.

The lattice constants and atomic parameters of $TiO_2$, $SnO_2$, $GeO_2$, and $MgF_2$ have been redetermined. In the $MO_6$ octahedra of rutile four Ti–O distances are shorter than the two others by 2% ; in the other compounds the linkages within the octahedra are equal within the limits of the experimental accuracy. P. G.

**arrison (F. W.).** *The crystal structure of barium dititanate, $BaO.2TiO_2$.* Acta Cryst., 1956, **9**, 495–500.

A determination of the crystal structure of $BaO.2TiO_2$, a compound formed in investigations of the $BaO–TiO_2$ system, shows that it is monoclinic with $a$ 9·410±0·004, $b$ 3·930±0·001, $c$ 16·892±0·013Å, β 103° 2′±3′, space group $A2/m$ and six formula units in the cell. The structural arrangement is discussed in relation to other baria–titania compounds. P. G.

**inha (A. P. B.), Sanjana (N. R.), & Biswas (A. B.).** *On the structure of some manganites.* Acta Cryst., 1957, **10**, 439–440.

Crystallographic data are given for several artificially prepared manganites ($A^{2+}Mn_2^{3+}O_4$, where $A$ is Cd, Mn, Mg, Zn, Cu, etc.). Some have a tetragonally deformed spinel structure, one has cubic normal spinel and one a cubic inverse spinel structure. [M.A. **5**–179, **10**–210] J. Z.

**Paton (F.) & MacDonald (S. G. G.).** *The crystal structure of pinnoite.* Acta Cryst., 1957, **10**, 653–656, 2 figs.

Pinnoite, $MgB_2O(OH)_6$, is tetragonal $P_2^4$ with $a$ 7·62±0·01, $c$ 8·19±0·01Å, $Z=4$, $D$ 2·29 g/cc. Structure determination by two-dimensional syntheses shows that boron is tetrahedrally co-ordinated by one oxygen and three $(OH)^-$ ions, two such tetrahedra sharing a single oxygen. The $(OH)^-$ ions surround magnesium atoms in octahedral coordination forming a structure which is neither layered nor chain-like but which contains long tubular voids parallel to $c$ [M.M. **28**–26]. J. Z.

**Smith (Deane K., *Jr.*), Gruner (John W.), & Lipscomb (William N.).** *The crystal structure of uranophane $[Ca(H_3O)_2](UO_2)_2(SiO_4)_2{\cdot}3H_2O$.* Amer. Min., 1957, **42**, 594–618, 9 figs.

Uranophane is monoclinic $P2_1$, $Z = 2$, with $a$ 15·97, $b$ 7·07, $c$ 6·68Å, and β 97·3°. The structure was determined from $h0l$ Weissenberg and $0kl$ precession data and is shown to be based on sheets parallel to (100) with the formula $\{(UO_2)_2(SiO_4)_2\}^{-4}$. Linking the sheets are calcium ions and water molecules (or hydronium ions), which results in eightfold coordination of calcium and sevenfold coordination of uranium by oxygens. The two closest form the linear uranyl ion with U–O distance 1·91Å, and the other five are in a plane normal to the axis of the uranyl ion. Atomic co-ordinates $x$, $y$, and $z$ are given, but for oxygens of water molecules these are incomplete and tentative, and further investigation is intended [M.A. **6**–430]. J. Z.

**Geller (S.) & Gilleo (M. A.).** *Structure and ferrimagnetism of yttrium and rare-earth garnets.* Acta Cryst., 1957, **10**, 239. J. Z.

**Zemann (Anna) & Zemann (J.).** *Die Kristallstruktur von Langbeinit, $K_2Mg_2(SO_4)_3$.* Acta Cryst., 1957, **10**, 409–413, 1 fig.

Langbeinite is cubic with $a$ 9·92Å, $Z=4$, space group $P2_13$, $D$ 2·824±·003 g/cc. The structure was determined by two-dimensional methods with the aid of the isotypical $Tl_2Mn_2(SO_4)_3$ ($a$ $10{\cdot}22_3$Å). K and Mg ions lie on threefold axes and $SO_4$ tetrahedra are in general position. The magnesium is in octahedral coordination and the coordination around potassium is irregular. Atomic parameters, interatomic distances, and $F$ values are given. J. Z.

**Welin (E.).** *The crystal structure of thaumasite $Ca_3H_2(CO_3/SO_4)SiO_4.13H_2O$.* Arkiv Min. Geol. Stockholm, 1957 (1956), **2**, 137–147, 4 figs.

By rotation and equi-inclination photographs the space group of thaumasite is shown to be $C6_3$ with $a$ 10·95 and $c$ 10·30Å which is in accordance with earlier investigation [M.A. **5**–325]. The positions of the atoms were determined by the trial-and-error method. The structure is characterised by –Ca–$SiO_4$–Ca–chains in the $c$-direction united mutually and with the $SO_4/CO_3$ groups, which are similar structural units, by oxygen as well as by hydrogen atoms. The number of water molecules is shown to be 13 instead of the earlier 14 or 15, a further two hydrogen atoms being included as in the formula stated in the title. The relation of some other structures to that of thaumasite is discussed. K. F.

**Macgillavry (C. H.), Korst (W. L.), Moore (E. J. W.), & Plas (H. J. van der).** *The crystal structure of ferrocarpholite.* Acta Cryst., 1956, **9**, 773–776.

Ferrocarpholite, the ferrous iron analogue of carpholite proper, is orthorhombic, $a$ 13·77, $b$ 20·18, $c$ 5·10$_9$Å with space group *Ccca*; its idealised formula is $FeAl_2(OH)_4Si_2O_6$ with eight units per cell. Its structure is based on $(SiO_3)$ chains very similar to those found in the pyroxenes, and confirms the classification given by Strunz. P. G.

**Strunz (H.).** *Ferrokarpholith-Karpholith.* Acta Cryst., 1957, **10**, 238.

Cell dimensions of carpholite $MnAl_2(OH)_4Si_2O_6$ from Schlaggenwald are $a$ 13·86, $b$ 20·13, $c$ 5·12Å, space group *Ccca*, $Z=8$, $D$ 2·9 g/cc. Comparison is made with ferrocarpholite from Celebes which has $a$ 13·77, $b$ 20·18, $c$ 5·10$_9$Å, space group *Ccca*, $Z=8$, $D=3·04$ g/cc. [see preceding abstract]. J. Z.

**Gay (P.).** *The crystallography of cerite.* Amer. Min., 1957, **42**, 429–432, 2 figs.

Cerite is found to have a primitive trigonal cell [Laue group $3m$] with slightly variable cell dimensions $a \approx 10·8$, $c \approx 37·7$Å; there is a pseudo-cell with halved $c$ axis length which is rhombohedral. The latter may be reconciled with a previous assignment of cerite to the monoclinic space group $I2/n$ or $In$, with $a$ 17·81, $b$ 10·85, $c$ 14·10Å, $\beta$ 109° 10′ [M.A. **13**–373]. Chemical analysis of a cerite from Bastnäs, Sweden, suggests a formula $(Ca,Ln)_3Si_2(O,OH,F)_9$ where Ln=lanthanon rare earths, with 20 or 21 formula units per cell. Intensities of certain X-ray reflections suggest a series of cerites with variable lime contents [M.A. **8**–157], the lime-free end-member having the rhombohedral cell with $c$ 18–19Å. Lessingite, beckelite, and britholite have structures different from that of cerite and dimensionally comparable with that of apatite. An idealised formula $(Ca,Ln\ldots)_2(Si,Al,P)(O,OH,F)_5$ is proposed for this series [M.M. **31**–455]. J. Z.

**Donnay (Gabrielle), Donnay (J. D. H.), & Kullerud (G.).** *Crystal and twin structure of digenite, $Cu_9S_5$.* Amer. Min., 1958, **43**, 228–242, 6 figs., 3 tables.

Synthesized digenite undergoes a reversible non-quenchable transformation between 60° and 65°C. Stability ranges and other qualitative data on the system CuS–$Cu_9S_5$–$Cu_2S$ are given. A cubic cell edge of $a$ 27·71Å$\pm$0·3%, five times the literature value, was measured, giving a unit cell with 100 $Cu_9S_5$ and a calculated sp. gr. of 5·715, against 5·6 observed. The only *hkl* reflections observed are the type $10m\pm l$, $10n\pm l$, $l$; $m$ and $n$ are integers. The structural absences are explained by twinning; the oc hedron consists of four rhombohedral crystals, oriented w hexagonal $c$ axes along the cube body-diagonals and th hexagonal $a$ axes along the simulated cubic cell-fa diagonals. The twin axis is $[\bar{3}77]$ in rhombohedral notati with a twin index of 5 and twin obliquity of 0. T rhombohedral cell ($a$ 16·16Å, $\alpha$ 13° 56′) contains one $Cu_9$ B. H. B

**Calvert (L. D.) & Barnes (W. H.).** *The structure lindgrenite.* Canadian Min., 1957, **6**, 31–51, 8 figs.

Atomic coordinates for lindgrenite, $2CuMoO_4.Cu(OH$ were derived from two-dimensional Patterson, electr density and difference syntheses using data from Weissé berg and precession photographs. The structure consi of chains formed by $CuO_4(OH)_2$ octahedra sharing edg cross linked through $MoO_4$ tetrahedra to form a thr dimensional network. Indexed powder photograph da are appended. [M.A. **6**–54, 147, **11**–101, **12**–400, 505] J. Z.

**Gay (P.).** *A note on celsian.* Acta Cryst., 1956, **9**, 474.

A single-crystal examination reveals that the bod centred true cell has a 14Å $c$-axis repeat; comparison made with body-centred anorthite, and it is suggested th the Si–Al arrangement is ordered in celsian. N. F. M. H.

**Bown (M. G.) & Gay (P.).** *Observations on pigeoni* Acta Cryst., 1957, **10**, 440–441.

Several pigeonites in pigeonite–augite lamellar int growths were examined and were found to have space gro $P2_1/c$ not $C2/c$ (the space group of augite). The X-r reflections which indicate a primitive lattice are slight diffuse, but no correlation can be discerned between diffus ness and composition or thermal history or treatmer Orientation relations between pigeonite and augite we noted. J. Z.

**Steinfink (H.) & Brunton (G.).** *The crystal structure amesite.* Acta Cryst., 1956, **9**, 487–492.

The hydrous magnesium aluminium silicate amesi $Mg_2AlSiAlO_5(OH)_4$, is hexagonal with $a$ 5·31$\pm$0·01, $c$ 14· $\pm$0·02Å, space group $P6_3$ and two formula units per c The structure is based on a kaolinite type of stacking layers held together by hydrogen bonds 2·97Å in leng The previously reported appearance of a strong 'olivi line in the powder pattern of amesite heated at 700°C shown to be a diffuse reflection due to stacking disorder the amesite. [M.A. **14**–21] P. G.

**nfink (Hugo).** *The crystal structure of chlorite. I. A monoclinic polymorph.* Acta Cryst., 1958, **11**, 191–195.

he chlorite studied is monoclinic, *C*2, with *a* 5·37, 30, *c* 14·25Å, β 96° 17′, *D* 2·85 g./cc. Its analysis gave $_2$ 21·7, $Al_2O_3$ 24·4, $Fe_2O_3$ 20·0, FeO 2·7, MgO 17·0, O 0·4, and it has $\alpha \approx 1{\cdot}610$, $\gamma \approx 1{\cdot}615$, $2V_\gamma$ 32° 48′. accepted chlorite structure is in general confirmed but s found that Si–O tetrahedra are rotated about the ction perpendicular to the sheets, and that the replace- nt of magnesium by iron and of silicon by aluminium s not take place randomly in the available sites. droxyls of the brucite layer form hydrogen bonds (2·92Å) h the basal oxygens of the talc layer. The structural mula is given as $(Mg_{2\cdot6}Fe^{2+}_{0\cdot2}Fe^{3+}_{1\cdot5}Al_{1\cdot2})(Si_{2\cdot2}Al_{1\cdot8})O_{10}(OH)_8$. A. **11**–104, 253] J. Z.

**nfink (Hugo).** *The crystal structure of a chlorite. II. A triclinic polymorph.* Acta Cryst., 1958, **11**, 195–198, 3 figs.

triclinic chlorite has *a* 5·34, *b* 9·27, *c* 14·36Å, β 97° 22′, ce group *C*1, *D* 2·71 g./cc. Its analysis gave $SiO_2$ 27·4, $O_3$ 18·9, $Fe_2O_3$ 2·4, $Cr_2O_3$ 2·3, FeO 0·8, MgO 34·0; mula $(Mg_{4\cdot9}Al_{0\cdot75}Fe^{2+}_{0\cdot17}Fe^{2+}_{0\cdot17}Cr_{0\cdot18})(Si_{2\cdot6}Al_{1\cdot4})O_{10}(OH)_8$; ≈ 1·580, $\gamma \approx 1{\cdot}585$, $2V_\gamma$ 44° 45′. The structure differs n that of the monoclinic polymorph [previous abstract] the relative arrangements of the two Si–O nets of the lc' layer. Rotation of tetrahedra occurs as in the noclinic chlorite, in amesite, and in dickite. Isomorphous stitution of Si by Al occurs randomly, and excess itive charge in the tetrahedral layer is compensated in octahedral layers of both 'talc' and 'brucite' nponents. The 'brucite' and 'talc' layers are linked hydrogen bonds. J. Z.

**vnham (R. E.) & Brindley (G. W.).** *The crystal structure of dickite.* Acta Cryst., 1956, **9**, 759–764.

Dickite, $Al_2Si_2O_5(OH)_4$, is monoclinic with *a* 5·15, *b* 8·95, 4·42Å, β = 96° 48′, space group *Cc* and four formula units cell. The structure confirms the polar arrangement of two kaolin layers in the unit cell; there is considerable tortion within the silica and alumina sheets of the ucture. P. G.

**ndley (G. W.) & Nakahira (M.).** *Further consideration of the crystal structure of kaolinite.* Min. Mag., 1958, **31**, 781–786, 3 figs.

The values of angles α and β for the triclinic cell of linite cannot be explained on the basis of the idealised sheet structure [M.M. **27**–242]. If the distorted sheet found for dickite [previous abstract] is assumed for kaolinite, then equal distribution of inter-layer hydrogen bonds leads to calculated values of α and β similar to those observed. The distorted structure also yields better agreement between calculated and observed powder X-ray intensities. [M.A. **4**–368, 465, **5**–187] J. Z.

**Zemann (J.).** *Die Kristallstruktur von $Li_2CO_3$.* Acta Cryst., 1957, **10**, 664–666, 1 fig.

$Li_2CO_3$ is monoclinic *C*2/*c* with *a* 8·39, *b* 5·00, *c* 6·21Å, β 114·5°. The planar $CO_3$ groups are almost perpendicular to [001] and are linked by lithium ions, which are tetrahedrally coordinated by oxygens. J. Z.

[**Ozerov (R. P.), Grinshpan (L. B.), & Bushinsky (G. I.)**] Озеров (Р. П.), Гриншпан (Л. Б.) и Бушинский (Г. И.). Некоторые рентгеноструктурные данные минералов группы апатита. [*Certain X-ray structural data for the apatite group of minerals*] Зап. Всесоюз. Мин. Общ. [Mem. All-Union Min. Soc.], 1956, **85**, 303–309, 3 figs.

X-ray studies of twelve phosphate minerals in respect of their *a*-dimension show that they fall into three groups: fluor-apatite 9·35—9·37, francolite 9·30—9·32, and kurskite 9·27—9·29 kX. The relation of cell dimension to composition is discussed. S. I. T.

[**Belov (N.V.)**] Белов (Н. В.). Структура силикатов. [*The structure of silicates.*] Зап. Всесоюз. Мин. Общ. [Mem. All-Union Min. Soc.], 1957, **86**, 239–244, 4 figs.

This is a short review of the present state of silicate structures, and of the recent contributions of Russian workers. S. I. T.

[**Pavlov (P. V.) & Belov (N. V.)**] Павлов (П. В.) и Белов (Н. В.). Кристаллическая структура гердерита, датолита и гадолинита. [*The crystalline structure of herderite, datolite, and gadolinite.*] Доклады Акад. Наук СССР [C.R. Acad. Sci., URSS], 1957, **114**, 884–887, 3 figs.

A detailed analysis of previous work done on these minerals. It is suggested that the atomic co-ordinates of gadolinite are closer to those of herderite than to those of datolite. S. I. T

[**Barsanov (G. P.)**] Барсанов (Г. П.). Структурные особенности строения метамиктных ниоботанталатов. [*Structural features of the structure of metamict niobotantalates.*] Труды Минер. Муз. Акад. Наук СССР [Trans. Min. Mus. Acad. Sci., USSR], 1957, **8**, 3–16, 13 plates.

Polished and etched surfaces of metamict niobotantalates were studied in reflected light and 26 photographs are reproduced illustrating the structure of columbite, fersmite, pyrochlore, microlite, mendeleevite, khlopinite, samarskite, yttrotantalite, euxenite, priorite, aeschynite, ampangabéite, wiikite, allanite and gadolinite. The structure of these and other minerals is described, especially with regard to the metamict state. Crystalline and amorphous structures in minerals are classified into ten types and the genetic aspects of metamict colloidal transformations are discussed.

S. I. T.

[**Budko** (**I. A.**) & **Frank-Kamenetzky** (**V. A.**)] Будько (И. А.) и Франк-Каменецкий (В. А.). Элементарная ячейка и пространственная группа кертисита (идриалина) [*The unit cell and the space group of curtisite (idrialite)*]. Зап. Всесоюз. Мин. Общ. [Mem. All-Union Min. Soc.], 1957, **86**, 716–719, 9 figs.

According to the X-ray and electronographic data (following in brackets) the dimensions of the unit cell of curtisite are : $a$ 6·33 (6·36), $b$ 8·06 (8·11), $c$ 30·97 (30·95) Å. The unit cell contains four molecules of $C_{24}H_{18}$. Diffraction class *mmmPnn*, space group *Pnnm*, or, even more probably *Pnn*2.

S. I. T.

[**Rumanova** (**I. M.**)] Румянова (И. М.). Кристаллическая структура астраханита. [*The crystalline structure of astrakhanite*]. Доклады Акад. Наук СССР [C. R. Acad. Sci. URSS], 1958, **118**, 84–87, 2 figs.

The newly determined space group and unit cell of bloedite (astrakhanite) agree with those determined by Lauro [M.A. **8**–10], while the Fourier analyses allowed the determination of the position of the atoms and the structure of the mineral, the main features of which are : Na and Mg oxygen octahedra linked into sheets by $H_2O$ units, while the sheets are linked by S oxygen tetrahedra. S. I. T.

[**Saldau** (**E. P.**)] Сальдау (Э. П.). Изменение размеров ячейки при окислении иоцита в магнетит и маггемит. [*The change of the dimension of the cell on oxidation of iozite into magnetite and maghemite.*] Зап. Всесоюз. Мин. Общ. [Mem. All-Union Min. Soc.], 1957, **86**, 324–335, 4 figs.

On the basis of X-ray data the author derives a formu a diagram and an interrelation between the fine structu of FeO, $Fe^{II}Fe_2^{III}O_4$ and $\gamma$-$Fe_2O_3$. S. I. T

**Frank** (**F. C.**). *On the X-ray diffraction spikes of diamo* Proc. Roy. Soc. London, 1956, **237A**, 168–174, 1

The anomalous X-ray reflections from some diamo are attributed to segregated planes of foreign atoms wh fail to reveal themselves in small-angle diffraction beca the increase in thickness and the increase in number electrons are just proportional to each other. The impu concerned is believed to be silicon. R. A. H

[**Mitrofanova** (**K. V.**)] Митрофанова (К. В.). Фотогон метрия трех основных типов кривогранных кристал алмаза. [*Photogoniometry of the three fundame types of diamond crystals with curved faces.*] Всесоюз. [Мин. Общ. [Mem. All-Union Min. Sc 1956, **85**, 563–568. S. I. T

**Kohn** (**J. A.**). *Twinning in diamond-type structure proposed model.* Amer. Min., 1958, **43**, 263–284.

Lateral twin boundaries, second-order twin joins, probable third-order twin joins have been observed silicon. Their directions are restricted to rows of site a coincidence site superlattice. Using (110)-proje coincident nets, seven permissible (*hhl*) boundaries ca derived ; these have high coincidence site density and t trans-boundary structure is " restorable " to a consider degree if the discontinuity oscillates between 2 or 3 sin crystallographic directions in each case. Constructions pictured showing the ideal, detailed structure for t proposed boundaries which are :—first order, {115}–{ {112}–{112}, {001}–{221}, {110}–{114} and second o {221}–{221}, {115}–{111}, {114}–{114}. Six of these been observed experimentally in the same silicon speci No other first- or second-order discontinuities were fo Grain boundary energy relations are discussed and refer is made to implications for semi-conductor properti A.

## ECONOMIC MINERALS AND ORE DEPOSITS

**Klar** (**G.**). *The important graphite deposits of the world.* Mining Mag., 1958, **98**, 137–142.

A review of available data on the economically important occurrences of graphite. Mention is made of micro-crystalline graphite from La Colorado, Sonora, Mex Kaiserberg, Hohentauern, and Mühldorf, Austria ; Pinerolo area of the French–Italian Alps ; and K Macrocrystalline graphite deposits are described from

sau area in the southern Bavarian Forest, Western many, in contact-metamorphosed schists on Senja nd, in the Tromsö district of Norway, and from Ceylon l Madagascar. R. A. H.

**rolle (E.).** *Les ressources minérales de l'Indochine.* Proc. 7th Pacific Science Congress (Auckland and Christchurch meeting), 1953 (for 1949), **2** 170–175.

Brief details, summarised in a table, are given of the e-war mineral production of Indo-China, and short ragraphs deal in turn with coal, tin and tungsten, zinc, ss sand, salt, phosphates, gold, precious stones, and timony. Several important new deposits are mentioned ; e most noteworthy, not yet fully explored, is a large atite deposit at Lao-Kay, on the Chinese frontier.

W. A. W.

**atanabe (Manjirô).** *Cobalt resources in Japan.* Proc. 7th Pacific Science Congress (Auckland and Christchurch meeting), 1953 (for 1949), **2**, 206–209, 1 fig.

— *Tungsten and molybdenum resources in Japan.* Ibid. **2**, 209–212, 1 fig.

— *Tellurium resources in Japan.* Ibid. **2**, 213–215, 1 fig.

The cobalt, tungsten, molybdenum and tellurium-aring deposits in Japan are briefly described and illus-ated by sketch-maps. W. A. W.

**oshimura (Toyofumi).** *Types of manganese deposits in Japan.* Proc. 7th Pacific Science Congress (Auckland and Christchurch meeting), 1953 (for 1949), **2**, 215–217.

The numerous manganese-bearing deposits of Japan are iefly classified. W. A. W.

**rmstrong (E. W.) & Straley (H. W., *III*).** *Geology and mineral resources of Mexico.* Proc. 7th Pacific Science Congress (Auckland and Christchurch meeting), 1953 (for 1949), **2**, 193–205, 4 figs.

The geology, mineral resources, and probable reserves of exico are summarised. Many references are given.

W. A. W.

**traley (H. W., *III*).** *Geology and mineral resources of Colombia.* Proc. 7th Pacific Science Congress (Auckland and Christchurch meeting), 1953 (for 1949), **2**, 182–192, 2 figs.

The geology, mineral production, and reserves of Colombia re briefly summarised. Useful references, several dealing ith emerald deposits, are given. W. A. W.

**Smith (Warren D.).** *Oregon's mineral resources.* Proc. 7th Pacific Science Congress (Auckland and Christchurch meeting), 1953 (for 1949), **2**, 175–179, 1 fig.

Mineral production in Oregon is briefly described. Production figures are summarised on a graph. W. A. W.

**Stewart (Richard M.).** *Mineral use in coated welding electrodes.* Calif. Journ. Mines and Geol., 1955, **51**, 9–19.

The minerals used for coating electrodes include rutile, magnetite, calcite, fluorspar, feldspar, talc, silica, brucite, and rhodochrosite. K. S.

**Ver Planck (William E.).** *Salt in California.* Calif. Div. Mines Bull. **175**, 1958, 168 pp., 2 maps. Price, $3.25.

In 1953 California produced 6 per cent. of the total amount of salt produced in the United States. Most of the salt was recovered from sea water by solar evaporation ; a minor proportion comes from the desert regions. Chapters are devoted to the geologic occurrence of salt, methods of recovery, the refining of salt, marketing of salt, salt in California Indian culture (by Robert F. Heizer), and history of the California salt industry. K. S.

**Jenkins (Olaf P.)** *et al.* *Mineral commodities of California. Geologic occurrence, economic development and utilization of the state's mineral resources.* Bull. Calif. Div. Mines, 1957, **176**, 736 pp., 89 tables, 505 figs. Price, $7.50.

This profusely illustrated volume, a revision of Bull. 156 [M.A. **11**–386] describes the general geology, mineralogy and occurrence ; methods of recovery ; uses, prices, and markets ; history of operations ; and various other aspects for nearly eighty commodities including abrasives, aluminium, antimony, arsenic, asbestos, asphalt and bituminous rock, barite, beryllium, bismuth, black sands, boron, bromine, cadmium, calcite, calcium chloride, carbon dioxide, cement, chromite, clay, coal, cobalt, copper, diatomite, feldspar, fluorspar, gemstones, gold, graphite, gypsum, iodine, iron ores, kyanite and andalusite, lead, limestone and lime products, lithium and lithium compounds, magnesium, manganese, mercury, mica, molybdenum, natural gas, nickel, nitrates, peat, petroleum, phosphates, platinum, pumice and perlite, pyrite, pyrophyllite, quartz, rare earth elements, salines, salt, sand and gravel, shale, silver, crushed and dimension stone, strontium minerals, sulphur, talc and soapstone, thorium, tin, titanium, tungsten, uranium, vanadium, wollastonite, zinc, zirconium and hafnium. K. S.

**Symons (Henry H.) & Davis (Fenelon F.).** *California mineral commodities in* 1952 *and* 1953. Calif. Journ. Mines & Geol., 1955, **51**, 299–400.

Petroleum led all commodities in value of production in 1953, followed by natural gas, cement, natural gasoline, sand and gravel, liquefied petroleum gases, stone, borates, iron ore, tungsten, gold, and salt. [See Jenkins, Olaf P., above.] K. S.

**Goodwin (J. G.).** *Lead and zinc in California.* Calif. Journ. Mines & Geol., 1957, **53**, 353–724.

Commercial values are confined largely to three geologic environments : faulted carbonate rocks of the Basin-Range province (south-eastern California), zones of shearing in metavolcanic rocks along the Sierra Nevada foothills, and fractured porphyritic rhyolite in the Shasta area (northern end of the Great Valley). Less important commercially are the contact deposits and high-temperature fissure veins within metamorphic roof pendants in the high Sierra Nevada, and the minor base metals associated with precious metals along the Mother Lode, the East belt, and the Klamath Mountains. K. S.

**Ver Planck (W. E.).** *History of borax production in the United States.* Calif. Journ. Mines & Geol., 1956, **52**, 273–291.

Veatch detected borax in California during 1856 ; the first production of borax began in 1864. Stages in the history of production are related by means of characteristic episodes, namely Lake County period (1864–72), Playa period (1872–90), Colemanite period (1890–1907), Death Valley period (1907–27), and Kramer period (1927-present). A chronologic bibliography of 53 entries accompanies the history. K. S.

**Jahns (Richard H.).** *The Pelican area, Palomas (Hermosa) District, Luna County, New Mexico.* Bull. New Mexico Bur. Mines & Min. Resources, 1957, **55**, 1–5, 1 pl.

Stratigraphic and structural study in the vicinity of the Palomas mining district in south-central New Mexico, with a brief note on the silver–base-metal deposits and their attendant wall rock alteration. D. H. R.

**Trumbull (James), Lyman (John), Pepper (J. E.), & Thomasson (E. M.).** *An introduction to the geology and mineral resources of the continental shelves of the Americas.* Bull. U.S. Geol. Survey, 1958, **1067**, 92 pp.

The areas for potential mineral resources on the continental shelves in the Western Hemisphere inclu (*a*) Gulf of Mexico (oil and gas, sulphur, phosphat (*b*) eastern North America (oil and gas, coal, iron o monazite and ilmenite), (*c*) Caribbean shelf area (oil a gas), (*d*) eastern South America (oil and gas, monazit (*e*) Pacific coast of South and Central America (oil a gas, coal), (*f*) western North America (oil and gas, co platinum and chromite), (*g*) Alaska (oil and gas, gold). K. S.

**Davidson (C. F.).** *The geochemical approach to prospecti for minerals.* Proc. Congr. on Modern Analyti Chemistry in Industry, St. Andrews, 1957, 228–23 Mining Mag., 1957, **97**, 9–16.

An account is given of some of the methods used prospecting for minerals, together with examples of t geochemical approach. The best hopes for the continu discovery of the rarer minerals essential to our econo lie in the development of a fabric of science formed geological experience interwoven with chemical knowledg it is to this fabric that the term geochemistry may m properly be applied. R. A. H.

**Toll (R. W.).** *Manganese in West Devon.* Mining Ma 1958, **99**, 17–19, 4 figs.

A brief account is given of past manganese mini activities to the north of Tavistock, near the villages Chillaton and Brentor. The manganese occurred pyrolusite, psilomelane, and occasional rhodonite, in irregu masses often accompanied by chert, adjacent to extens greenstone intrusions in argillaceous Carboniferous roc R. A. H.

**Earp (J. R.).** *Mineral veins of the Minera-Maeshc district of North Wales.* Bull. Geol. Surv. Gr Britain, 1958, **14**, 44–69, 3 pls., 3 figs.

The veins have been worked for galena for centuri possibly since Roman times, and some blende has be won. Gangue minerals are calcite, fluorite, and quar Baryte, pyrite, chalcopyrite, cerussite, and smithsonite also recorded. The mines are all now abandoned. P. A. S.

**Dines (H. G.).** *The West Shropshire mining region.* B Geol. Surv. Great Britain, 1958, **14**, 1–43, 4 p 5 figs.

A comprehensive account of the mines and mineralizat of the Shelve–Habberley, and Breidden Hills areas. T

ies, some known in Roman times, were worked first galena, then for blende, and finally for baryte and ite. Witherite, fluorite, copper minerals, cerussite, and neral oil or pitch are also recorded. P. A. S.

**en (G. W.).** *The Central Mendip lead-zinc orefield.* Bull. Geol. Surv. Great Britain, 1958, **14**, 70–90.

An account of the ore deposits, mining and mineralization. lena and smithsonite have been the main ores associated h baryte, calcite, quartz, iron ores, manganese oxides, ondary lead minerals, and traces of blende and fluorite. e mines, which were worked in Roman times, are all v abandoned. P. A. S.

**ll (George W.).** *An ancient gold and copper mine.* Mining Mag., 1956, **95**, 277–279, 3 figs.

A brief note on the Vigra mine, half a mile north-west Bont-ddu, between Barmouth and Dolgelley, Merioneth-re, one of the "Dolgelley Gold Belt" series of mines. R. A. H.

**acon (Jules).** *Nouvelles observations sur le gîte de Boukdema (Algérie).* C.R. Acad. Sci. Paris, 1954, **238**, 1438–1440.

The lead–zinc deposit of Boukdema in Jurassic dolomites s a system of Cu-bearing dykes. Microscopic examination ows the presence, in the probable order of formation ginning with the oldest, of pyrite, arsenopyrite, hematite, alcopyrite, galena, stephanite, fahlerz, famatinite-luzonite, ver, bornite, chalcocite, covelline, goethite, malachite, d azurite. E. J. & A. S.

**rotich (M.)**] Протич (М.). Минералошко-геолошка студија солитних руда гвожча Србие. [*Mineralogical and geological study of oolite iron ores of Serbia*]. Геолошки анали Балк. пол. [Annales géol. de la péninsule balkanique], 1956, **24**, 323–400, 14 figs., 3 pls., 1 map. (Serbian with French summary.)

The oolitic iron ores of wide occurrence in Serbia in etaceous strata and on altered serpentine bedrock are scribed, with 18 chemical analyses, and thermal, X-ray, d optical data. The ore, often with pisolitic structure, mposed of the silicates chamosite, chlorite and pseudo-lorite, oxides $\alpha$- and $\gamma$-$Fe_2O_3$, and iron hydroxide minerals, genetically connected with the weathered serpentine cks. During the periods of transgression material from the weathering of those rocks accumulated as oolitic iron deposits from which some new textures (replacement of Hydrozoa) are described. Z. M.

**Cousins (C. A.).** *The value distribution of economic minerals with special reference to the Witwatersrand gold reefs.* Trans. Geol. Soc. South Africa, 1956, **59**, 95–113, 8 figs.

Value-distribution curves are given for hydrothermal–pneumatolytic deposits (gold and stibnite from Consolidated Murchison mine, Letaba, N. Transvaal; galena and blende from Llanrwst mine, Wales; copper, zinc, and silver from Letaba Copper and Zinc Corp., N. Transvaal; gold from Filabusi district, S. Rhodesia), magmatic ores (platinum from Rustenburg mines, Transvaal), and placer ores (gold and uranium, and gold and pyrites in Black Reef, Brakpan, Transvaal). Curves are also given for gold and uranium, and for osmiridium and for silver in relation to gold from several horizons in the Witwatersrand System and they show the characteristics of a placer deposit. E. D. M.

**Connah (T. H.).** [*Lode rutile, Mount Perry.* Queensland Govt. Mining Journ., 1957, **58**, 909.] British Ceram. Abstr., 1958, abstr. 1555.

Rutile occurs as irregular veins, bands, strings, and disseminations in a breccia composed of fragments of a friable quartz rock. R. A. H.

**Warden (A. J.) & Pallister (J. W.).** *A gypsum-anhydrite deposit in Somaliland.* Mining Mag., 1958, **98**, 333–337, 1 fig.

Most of the main gypsum–anhydrite series of Lower Eocene age on Suria Malableh Ridge, 9½ miles from Berbera, is composed of recrystallized gypsum after anhydrite: the formation of gypsum at the expense of anhydrite may, however, prove to be merely a superficial weathering phenomenon. The anhydrite is a dense crystalline greenish-grey rock, but in places development of gypsum along the joints and cracks has extended to form a rock mainly composed of gypsum with relict nodules of anhydrite. The petrography of the series and of the adjacent marly shales and limestones is outlined: probable reserves include 6,500,000 tons of gypsum of 90% purity and a bed of anhydrite 7½ ft. thick containing 400,000 tons of 95% purity. R. A. H.

**Holloway (H. L.).** *Alluvial goldfield in Ethiopia.* Mining Mag., 1958, **98**, 73–79.

The Kebre Mengist (Adola) goldfields lie about 400

kilometres south of Addis Ababa. No gold-bearing veins have been discovered in the crystalline schists, basic hypabyssal intrusives, and pegmatites of the area, but water-worn fairly coarse gold is found in the stream valleys (nuggets of 5–10 oz. are not unusual) and it is believed that this alluvial gold is a residual deposit. R. A. H.

**Schilling (John H.).** *Geology of the Questa Molybdenum (Moly) Mine area, Taos County, New Mexico.* Bull. New Mexico Bur. Mines & Min. Resources, 1956, **51**, 1–83, 29 figs., 5 pls.

The Questa molybdenum mine, unique in containing high-grade molybdenite ore in fissure veins, is in the Taos Range of the Sangre de Cristo Mountains. The Taos Range is made up chiefly of Precambrian metamorphic rocks overlain by Tertiary volcanic rocks ; scattered small areas of sedimentary rocks of possible Pennsylvanian–Permian age are also common throughout the range. Late Tertiary soda-granite stocks and dikes, localized in a wide east-trending downfaulted zone that transects the Range, intrude the older rocks. Alteration of two types has affected the rocks in the area—widespread argillic alteration along the downfaulted zone and intense propylitization around the margins of the soda-granite stocks.

The ore deposits consist of an irregular network of fissure veins localized in a relatively small area in the outer sheeted zone of one of the soda-granite stocks. The veins are largely quartz and molybdenite, with locally abundant biotite, fluorite, pyrite, chalcopyrite, calcite and rhodochrosite. Wall-rock alteration (silicification and minor sericitization with local development of montmorillonite) is not intense. The veins were formed during late Tertiary time, soon after the intrusion of the soda granite, hydrothermal solutions from the still fluid core precipitating the ore and gangue minerals in the solidified and sheeted outer zone of the stock as a result of the drop in pressure and temperature. D. H. R.

**McKinlay (Philip F.).** *Geology of Questa Quadrangle, Taos County, New Mexico.* Bull. New Mexico Bur. Mines & Min. Resources, 1957, **53**, 1–19, 1 pl.

Description of the geology and mineral deposits of the south-western quarter of the Taos Range of the Sangre de Cristo Mountains, a fault-block range with complex geology, and the Taos Plain, a bolson, to the west. The mineralization is divided into three distinct types : Tertiary molybdenite–fluorite–pyrite–quartz vein mineralization around Red River ; Tertiary (?) chalcopyrite and galena in small quartz veins, shears, and fractures within Precamb rocks along the Rio Hondo ; Precambrian pyrite z within Precambrian quartzite and metamorphic r along San Cristobal creek. D. H.

**Stoll (W. C.).** *Geology and petrology of the Mas chromite deposit, Zambales, Luzon, Philippine Isl* Bull. Geol. Soc. America, 1958, **69**, 419–448, 15

The Masinloc deposit, the world's largest produce refractory-grade chrome ore, occurs in a layered ultran complex, intruded by microdiorite and similar dikes overlapped by Miocene sediments. The rocks of complex, the field relations of the ore, and the distribu of the chromite are described in detail. Twenty analyses of the ore and of concentrates of the ore are gi The high Al and Mg content of the chromite and its text relations are cited in support of Bowen's hypothesis the chromite crystals formed during falling temperatur reaction of early-formed spinel with the melt, and settled beyond reach of liquid which could resorb them A. L.

**Grenier (Paul E.).** *Gisements nickelifère et cuprifèr Eastern Metals Corporation, Limited, Canton Ro* Ann. de l'ACFAS, 1955, **21**, section VII, 118- [Association Canadienne-Française pour l'Avancer des Sciences.]

These ore-deposits occur in silicified zones near contact between slates of the Beauceville group (M Ordovician) and lavas of the Coldwell group (Cambria the Appalachians of south-eastern Quebec, where these groups are intruded by peridotite. There are two zones, known as the North zone and the South zone. North zone contains both massive and dissemi sulfides : millerite, violarite, nickeliferous pyrite (bravo sphalerite, chalcopyrite, and chromite. The ga minerals are : quartz, chlorite, siderite, dolomite, and Another opaque mineral is not positively identified, b believed to be siegenite or carrollite. In the South the sulfide minerals are disseminated ; they are p arsenopyrite, chalcopyrite, and sphalerite. G.

**Blais (Roger A.).** *Les contrôles structuraux de la dépo d'or à la mine O'Brien, comté d'Abitibi-Est.* An l'ACFAS, 1955, **21**, sect. VII, 132–137, 2 figs.

Quartz veins within a complex of volcanic and mentary rocks of early Precambrian age at O'Brien contain native gold. The sequence of events, establ

n petrographic data, in the formation of these quartz
as is (1) hydrothermal alteration of wall rock, (2) depo-
on of quartz, (3) fracture of quartz veins, (4) mineraliza-
and (5) deposition of more quartz, carbonate, pyrite
chlorite. The fractures developed preferentially in
mpetent strata (conglomerate, diorite-porphyry). The
eralization was localized along : (1) drag-folds (S or Z
es), (2) inflection points in the strike of the veins,
the intersection of two or more veins, (4) portions of
veins near graphitic shears in the walls. Minerals of
veins are quartz, albite, tourmaline, carbonate, scheelite,
tite, rutile, arsenopyrite, pyrite, and gold. G. P.

**ons** (**Frank S.**) & **Straczek** (**John A.**). *Geology of the manganese deposits of Cuba.* Bull. U.S. Geol. Survey, 1958, **1057**, 289 pp.

The 172 mines, mine groups, and prospects may be
erally divided into two types of deposits : bedrock and
erficial. Bedrock deposits may be subdivided into bed-
and nonbedded types ; further subdivisions are based on
neralogy, country rock, and presence or absence of
per. Bedrock deposits, especially the bedded type, have
n more productive than surficial ones. Principal ore
nerals include psilomelane-type oxides (in almost all
rock deposits), pyrolusite (in all deposits), hausmannite,
nganite, ranciéite and wad. Bementite and neotocite
the most abundant silicates ; braunite is common ;
ite, orientite, and piemontite are relatively rare. The
st abundant gangue minerals include chlorite, minerals
he montmorillonite group, zeolites, hematite, and calcite.
of at least two new psilomelane-type minerals from
a, tentatively named *delatorreite* " after Carlos de la
re, eminent Cuban paleontologist ", is the most abundant
omelane-type oxide. K. S.

**l** (**W. C.**) & **Armstrong** (**Frank C.**). *Optical calcite deposits in Park and Sweet Grass Counties, Montana.* Bull. U.S. Geol. Survey, 1958, **1042-M**, 431–479.

The calcite occurs as thick massive veins that occupy
ts, as systems of branching smaller veins, or as stock-
ks of veinlets. A few veins contain stilbite ; laumontite
chalcedony are rare. Some of the larger calcite veins
nd over several thousand feet on the surface and may
e a maximum thickness of 20 feet. Many veins show
spicuous banding parallel to their walls ; the individual
ds show comb structure. Tabular vugs (the largest
sured 70 feet by 30 feet by 3 feet), created by incomplete
ng of fissures, have been the source of all optical calcite
mined. Rhombohedrons and scalenohedrons are the most common forms. Crystal faces are severely etched by groundwater. Principal defects include excessive opaqueness, twinning, and incipient fracture. K. S.

**Usher** (**John L.**). *Brown " Coal " in the Labrador Trough.* Proc. Geol. Assoc. Canada, 1954, **6**, 99–101.

Coal-like material was encountered in three drill holes in the Ruth Lake No. 3 ore body. The iron ore appeared to overlie and underlie the " coal ", but the structural relations were not established. The " coal " material probably belongs to the family Cupressacea, which appeared first in mid-Mesozoic and is thriving today. Two explanations are suggested : the coal deposited during Mesozoic or Cenozoic time on a surface underlain by iron ore was later folded or faulted into the ore ; or it represents a crevasse filling of very local extent, which was drilled along its strike. The implications are that the enrichment of the ore and the diastrophic movements occurred much later than previously thought ; this is not supported by local geological evidence. J. L. D.

**Fockema** (**R. A. P.**). *A brief description of the iron–manganese deposits at Kampumba, Northern Rhodesia.* Trans. Geol. Soc. South Africa, **60**, for 1957, 81–84, 4 pls.

These deposits occur 52 miles east of Broken Hill above Basement limestone and schist. Iron ore is essentially hematite, and manganese ore psilomelane with braunite and hausmannite. The latter is derived from rhodochrosite–rhodonite–quartz veins. E. D. M.

**Gjelsvik** (**T.**). *Pitchblende mineralization in the Precambrian plateau of Finnmarksvidda, Northern Norway.* Geol. Fören. Förh. Stockholm, 1957, **79**, 572–580, 6 figs.

Albite-syenite, veins and sills are found in a brecciated zone passing through granitic rocks and greenstones. The microbrecciated albite became partly replaced by calcite. Locally within the brecciated zones, deposition of hematite and pitchblende, partly colloform, has taken place. The connection between carbonatization of albite-syenite and pitchblende mineralization is discussed. P. Lggn.

**Heier** (**Knut**). *The Ørsdalen tungsten deposit.* Norsk Geol. Tidsskr., 1955, **35**, 69–85, 5 figs.

The deposit, located some 40km. N.E. of Egersund in South Norway and known, since 1918, to carry tungsten minerals, occurs in a migmatitic complex of granodioritic-

gneisses with amphibolitic bands and inclusions. The ore minerals are mainly molybdenite, scheelite, and wolframite. The wolframite—really ferberite—occurs as lens-shaped lumps in a few local concentrations, while the scheelite is found scattered over much wider areas. The lenses of wolframite are always surrounded by scheelite. This is interpreted as a result of "scheelitization" of wolframite by Ca-metasomatism due to late hydrothermal solutions. Such a process is easily shown to take place by laboratory experiments. Correspondingly the mineral facies is lower in the narrow mineralized zones than in the surrounding gneisses. [M.A. **13**–527.] I. W. O.

[**Grigoriev** (**Iv. F.**)] Григорьев (Ив. Ф.). Генезис оловянных и оловянно-вольфрамовых месторождений Забайкалья. [*The genesis of tin and tin-tungsten deposits of the Transbaikal region.*] Изв. Акад. Наук СССР, Сер. Геол. [Bull. Acad. Sci. URSS Sér. Géol.], 1957, **8**, 16–30, 2 figs.

The following formations are discussed: cassiterite-bearing skarn, granite and pegmatite and also various cassiterite-bearing mineral veins. In veins the author distinguishes five distinct morphological types of cassiterite crystals. The geochemistry of tin-bearing ore solutions is discussed. S. I. T.

[**Sindeeva** (**N. D.**).] Синдеева (Н. Д.). Селен и теллур в месторождениях различных генетических типов. [*Selenium and tellurium in deposits of different genetic types.*]. Изв. Акад. Наук СССР, Сер. Геол. [Bull. Acad. Sci. URSS, Sér. Géol.], 1958, **5**, 78–94.

This is a review and classification of genetic types of selenium and tellurium deposits. These two elements may occur concentrated or disperse. The geochemistry and the genetic types of deposits are discussed.

S. I. T.

[**Vlasov** (**K. A.**)] Власов (К. А.). Основные генетические типы редкометальных месторождений и факторы их образования. [*The principal genetic types of deposits of rare metals and factors of their formation.*] Изв. Акад. Наук СССР, Сер. Геол. [Bull. Acad. Sci. URSS, Sér. Géol.], 1957, **12**, 13–32.

Nineteen genetic types of rare-metal deposits are distinguished and the principal factors of their formation are discussed. S. I. T.

[**Volfson** (**F. I.**), **Kreiter** (**V. M.**), & **Lukin** (**L. I.**)] Вол (Ф. И.), Крейтер (В. М.) и Лукин (Л. И.). Осно итоги изучения рудных полей и месторождений в С [*The main results of the study of ore fields stru and ore deposits in the USSR.*] Изв. Акад. СССР, Сер. Геол. [Bull. Acad. Sci. URSS, Sér. G 1957, **11**, 58–81, 8 figs.

The following features are discussed: the distributi ore fields, the structure of certain magmatic, pegma skarn, hydrothermal, and metasomatic ore deposits, met of study, specific problems of ore deposits. A bibliogr of 112 items is appended. S. I.

[**Petrov** (**R. P.**)] Петров (Р. П.). К номенклатуре морфических пород железорудных формаций. *nomenclature of metamorphic rocks of iron ore forma* Изв. Акад. Наук СССР, Сер. Геол. [Bull. Acad URSS, Sér. Géol.], 1957, **9**, 54–71, 3 figs.

The nomenclature of the world's Precambrian iron of metamorphic origin is discussed and the following t are suggested: (a) one-component rocks; banded quar banded ironstone slate, banded chert, banded ja (b) two-component rocks; itabirite (banded quartz iron ore), jaspilite (banded jasper, chert, and ores), fe nous shale, schistose ironstone, quartzite-shale, sch quartzite: (c) three-component rocks; taconite (ba quartz, slate, and iron ore), jaspilite-taconite (jasp chert instead of quartz). S. I.

[**Glagolev** (**A. A.**)] Глаголев (А. А.). Проявления гипоге оруденения в железистых кварцитах Курской магн аномалии. [*Evidences of hypogene mineralizati ferruginous quartzites of the Kursk magnetic ano* Изв. Акад. Наук СССР, Сер. Геол. [Bull. Acad URSS, Sér. Géol.], 1957, **8**, 31–39, 10 figs.

It is suggested that the rich magnetite-hematite o this region were formed by the leaching out of accompanied by the recrystallization of magnetite a partial transformation into hematite. S. I.

[**Ginzburg** (**A. I.**) & **Gorzhevsky** (**D. I.**)] Гинзбург ( и Горжевский (Д. И.). К вопросу о взаим редкометальных пегматитов и некоторых типов р жил. [*On the interrelation between rare metal peg and certain types of ore veins.*] Изв. Акад. Наук Сер. Геол. [Bull. Acad. Sci. URSS, Sér. Géol.], **6**, 14–29.

ıe relation is traced between granite pegmatites of pure line of descent and cassiterite, tungsten, and ·bdenite quartz veins. It is concluded that both sets connected with intrusive bodies, but they are formed fferent depths and under different conditions and that natite formation is followed by the hydrothermal vein ation. Typical minerals and elements belonging to e rock types are discussed. S. I. T.

**ropov (P. Ya.)**] Антропов (П. Я.). Курские магнитные аномалии. [*Kursk magnetic anomalies.*] Природа [*Priroda*] 1958, no. **7**, 16–23, 6 figs.

ecent survey of the region of Kursk magnetic anomalies aled the existence, below a cover of later sedimentary s some 40–500 metres in thickness, of a belt of highly ed Proterozoic rocks, consisting of gneisses, schists, and iginous quartzite. Within the blanket of the ancient t of weathering there are zones and pockets of a rich tite iron ore, some of it containing over 60% metallic . The estimated total reserves of iron ore are 20 milliard and the probable maximum future annual production )–80 million tons. S. I. T.

**ndohr (Paul).** *Die Manganerze.* Congreso Geol. Intern., México, 1956, Symposium sobre Yacimientos de Manganeso, **1**, 19–73, 35 figs.

summary of the mineralogy of the oxides of manganese ading for each mineral notes on its unit cell, optical perties in transmitted and reflected light, paragenesis, diagnostic features, with X-ray powder data. The erals described are hausmannite, hydrohausmannite, aerolite, hydrohetaerolite, jacobsite, franklinite, bixbyite, anite, manganite, groutite, polianite, pyrolusite, ramsite, psilomelane, cryptomelane, hollandite, coronadite, ophorite, chalcophanite, todorokite, and woodruffite, ether with X-ray powder data only for hematite, hite, and lepidocrocite. R. A. H.

**uccini (Renzo).** *Qualque considerazione sul comportamento geochimico et sul ciclo geochimico del manganese.* Ibid. **1**, 135–146.

discussion on the geochemical cycle of manganese with ticular emphasis on the primary and secondary mentary deposits. R. A. H.

**uin (E.).** *Sur les gisements de manganèse sédimentaires.* Ibid. **1**, 99–106.

Various Moroccan manganese deposits are discussed and particular reference is made to syngenetic sedimentary deposits whose origin is linked with volcanic activity. The various metallogenic problems posed by these manganese deposits are enumerated. R. A. H.

**Marchandise (H.).** *Contribution à l'étude des gisements de manganèse sédimentaires.* Ibid. **1**, 107–118.

The various geochemical and genetical problems posed by sedimentary manganese deposits are discussed. In particular the difficulty of understanding how manganese deposits poor in iron are derived from rocks which have an average Fe : Mn ratio of 50 : 1 is considered. The conditions for the precipitation of manganese in marine environments are studied using the approach of Krumbein and Garrels [Journ. Geol., 1952, **60**, 1–33]. R. A. H.

**Park (Charles F., *Jr.*).** *On the origin of manganese.* Ibid **1**, 75–98.

Manganese deposits are classified in five types according to their origin : hydrothermal deposits ; sedimentary deposits ; deposits associated with submarine flows and composed mainly of low-temperature silicates and hausmannite ; metamorphic deposits ; and residual deposits and laterites. The genetic relationships of these deposits is discussed : residual and sedimentary deposits contain the largest amounts of ore. R. A. H.

**Krauskopf (Konrad B.).** *Separation of manganese from iron in the formation of manganese deposits in volcanic associations.* Ibid. **1**, 119–131.

Although some bacteria may precipitate manganese preferentially to iron, this mechanism is only adequate to explain some small manganese deposits. A possible explanation for the large scale separation of the metals is based on the greater ease of oxidation of iron and the greater insolubility of iron compounds. If a dilute acid solution containing manganese and iron is gradually made alkaline while exposed to oxygen the iron may be completely removed before manganese begins to precipitate : experimentally a basaltic andesite lava from Paricutin was used, dilute acid percolating through the lava and then through calcite. This mechanism would, however, require that iron oxide in amounts many times that of manganese be

deposited in the rocks through which the solutions have come. R. A. H.

**Buckenham** (**M. H.**), **Rogers** (**J.**), & **White** (**C. C.**). *The flotation of talc from the talc–magnesite of the Cobb valley, Nelson.* N.Z. Journ. Sci. & Techn., 1956, **37**, 437–444.

A talc–magnesite deposit has been derived from the alteration of an ultrabasic intrusion to serpentine and carbonate: the serpentine later being altered to talc, giving a rock with 60% talc, 35% magnesite, and 5% magnetite and chromite. The addition of 0·1 lb of pine oil per ton of ore at the natural pulp pH of 8·2 gave a 98% concentrate of talc, the opaque minerals having been removed magnetically. R. A. H.

**Anon.** [**Higham** (**F.**), *Editor*]. *China stone from the Isle of Man.* Mining Mag., 1957, **97**, 78–82.

The partly kaolinized granite of Granite Mountain near Foxdale is being crushed and separated into a fraction containing feldspar 55% and quartz 45%, which is used as chinastone flux in the pottery industry, and a fraction (≈15%) containing mica flakes. Chemical analysis of the quartz-feldspar fraction gave $SiO_2$ 77·48, $TiO_2$ nil, $Al_2O_3$ 14·95, $Fe_2O_3$ 0·16, MnO tr., MgO tr., CaO 0·25, $Na_2O$ 4·00, $K_2O$ 2·60, F nil, ign. loss 0·31 [=99·75]. R. A. H.

**Shelton** (**J. E.**) & **Stickney** (**W. A.**). *How to process alluvial sand for tantalum–columbium.* Engineering & Mining Journ. New York, 1957, **158**, no. 4, 93–95.

A sample of dredge concentrates from the Bear Valley, Idaho, contains magnetite, titaniferous magnetite, and minor quantities of ilmenite, garnet, quartz, feldspar, hornblende, allanite, biotite, epidote, limonite, hematite, sericite, euxenite, and ilmenorutile. R. G. W.

**Brindley** (**G. W.**) & **Sutton** (**Willard H.**). *An X-ray mineralogical study of some British Guiana bauxite deposits.* Econ. Geol., 1957, **52**, 391–399, 5 figs.

Semi-quantitative mineralogical analyses have been carried out by X-ray diffraction methods on samples of bauxite from British Guiana. The variation of the gibbsite–kaolinite content, the prevalence of anatase, and the variation in the crystallinity of the kaolinite are discussed. R. A. H.

[**Kostov** (**Ivan**)] Костов (Иван). К вопросу об изоморфи среди минералов сульфосолей. [*On isomorph among the minerals of sulphosalts.*] Зап. Всесо Мин. Общ. [Mem. All-Union Min. Soc.], 1957, **86**, 342, 5 figs.

A review and classification, as expressed by a serie diagrams, of the group of minerals represented by c bination of cations Pb, Ag, and Cu with anion group As, Sb, and Bi associated with S. S. I.

[**Magakyan** (**I. G.**)] Магакьян (И. Г.). Сурьмянис теллуровисмутит Зодского золоторудного месторожде (Басаргечарский район Армянской ССР). [*Antim tellurobismuthite of the Zodsky gold deposit (Ba gecharsky region of the Armenian S.S.R.).*] Всесоюз. Мин. Общ. [Mem. All-Union Min. Soc.], 1 **86**, 342–346.

Antimony tellurobismuthite in platy crystals resemb molybdenite is found enclosed in quartz. Analysis g Te 47·5, Bi 46·9, Sb 2·7, S 0·45 corresponding to $Bi_{10}SbT$ According to the X-ray data this mineral differs f tetradymite and other known tellurides. S. I.

[**Romanova** (**E. M.**)] Романова (Е. М.). О структуре бер рита с месторождения Зопхито. [*On the struc of berthierite from the Zopkhito deposit.*] Зап. Всес Мин. Общ. [Mem. All-Union Min. Soc.], 1957, **86**, 488.

Berthierite, from a locality in western Caucasus analysis gave Sb 56·23, S 28·83, Fe 11·50, Zn 1·02, Mn Bi trace, =97·89 plus insol. res. 1·71. X-ray data: *a* 1 *b* 14·14, *c* 3·76 kX. The structure is discussed. S. I.

[**Eliseev** (**E. N.**) & **Smirnova** (**S. I.**)] Елисеев (Э. Н Смирнова (С. И.). Железисто-магнистый ретге [*Iron-magnesium retgersite*]. Зап. Всесоюз. Мин. [Mem. All-Union Min. Soc.], 1958, **87**, 3–13, 3 figs

Retgersite is found in the oxidation zone of sulphid deposits of Pechenga, Kola peninsula. It occurs as g and fibres of light green colour, extinction straigh nearly so, elongation positive, birefr. ≈ 0·020 to 0 refr. ind. (average) 1·492. Chemical analysis gave 17·77, FeO 3·53, CaO 0·34, MgO 2·82, ZnO 0·61, CaO $SO_3$ 31·24, $H_2O$ 40·39, CuO 0·15, $Al_2O_3$ 0·23, insol. res. =100·32. X-ray data *a* 6·753, *c* 18·42Å. S. I.

# EXPERIMENTAL MINERALOGY

**le (O. F.) & Harker (R. I.).** *Synthesis of spurrite and the reaction wollastonite + calcite = spurrite + carbon dioxide.* Amer. Journ. Sci., 1957, **255**, 226–234, 4 figs.

his paper reports the first synthesis of spurrite $_2SiO_4.CaCO_3$) with properties very similar to those of natural mineral. The *PT* curve for the reaction astonite + calcite = spurrite + carbon dioxide passes ugh 800°C at 1,000 lb/in² (approx.) and 1000°C at 0 lb/in² (approx.). Spurrite can exist in equilibrium g with calcite and wollastonite on the low temperature of the *PT* curve but only in the absence of $CO_2$. e $CO_2$ is almost certainly present during progressive amorphism the occurrence of spurrite will indicate that *PT* conditions on the high-temperature side of the e have been attained. Possible reasons are given for failure to synthesize tilleyite on the low temperature of the spurrite curve. W. S. M.

**art (J.) & Šćavničar (S.).** *Synthèse hydrothermale du beryl.* Bull. Soc. franç. Min. Crist., 1957, **80**, 395–396.

eryl has been hydrothermally synthesized from a ture of $SiO_2$, $Al_2O_3$, and $BeCO_3$ with the addition of er, the pressure varying from 400 to 1,500 bars. At °C beryl appeared as a fine white powder, while at °C transparent colourless crystals with the forms {10$\bar{1}$0} {0001} were obtained, together with small amounts of nacite and chrysoberyl. If a small amount of chromium laces part of the aluminium of the starting material, nacite, quartz, chromium oxide, and faintly green beryl obtained : this green colour may be due to the replacet of Al by Cr in the structure of beryl or merely to usions of chromium oxide. [M.A. **8**–269, 270, **9**–51, 104.] R. A. H.

**kle (E. R.), Gard (J. A.), & Taylor (H. F. W.).** *Tricalcium silicate hydrate.* Journ. Chem. Soc., 1958, 1351–1355.

he composition of this artificial compound is shown to $3CaO.SiO_2.1\frac{1}{2}H_2O$ : it has a hexagonal or trigonal unit with $a$ 10·00, $c$ 7·48Å, with strong pseudo-halving of $c$ atomic contents $Ca_{12}Si_4O_{26}H_{12}$ ; $D$ (calc.) 2·61 g/cc. R. A. H.

**nck (E. H.) & McQuaig (J. A.).** *Experimental studies of rheomorphism.* Proc. Geol. Assoc. Canada, 1954, **6**, 95–96.

Granite, syenite, gabbro, diabase, and peridotite were kept at fixed temperatures near their melting points for periods ranging from two hours to ten days, in the temperature range 800 to 1,100°C, and in pure gas atmospheres (air, city gas, carbon monoxide, and carbon dioxide) in inconel bombs under pressures ranging from 30 to 300 atmospheres. The samples, quenched and studied in thin section, indicated that the ferromagnesian minerals started to melt before the felsic. In general it was found that a reducing atmosphere favoured the early melting of the minerals containing iron and magnesia. It is suggested that partial anatexis under certain conditions may give rise to an ultrabasic palingenic magma. J. L. D.

**Nagy (J.) & Tarján (I.).** *Über die Züchtung künstlicher Quarzkristalle.* Acta Phys. Hungaricae, 1957, **6**, 485–488.

Quartz crystals were grown by seeding from solution in 5% $Na_2CO_3$+0·4% KOH, with temperatures between 260° and 520°C and pressures from 40 to 1,800 atmospheres. The best results were obtained under high pressure in the temperature range 370–410°C. [M.M. **29**–858 ; M.A. **11**–368, **12**–75, 76] R. A. H.

**Barrer (R. M.), Buser (W.), & Grütter.** *Synthetischer "Faujasit". I. Eigenschaften und Ionenaustauschcharakter.* Helvetica Chim. Acta, 1956, **39**, 518–530.

The rare zeolite faujasite has been synthesized and its analyses indicate a composition of $Na_{0\cdot43}[Al_{0\cdot43}Si_{0\cdot57}]aq$. Isomorphous replacements of the type $Na^+Al^{3+} \rightleftharpoons Si^{4+}$ are apparently possible, and in addition replacements by ion exchange involving various inorganic and organic ions have been effected. Unit cell dimensions remained fairly constant among the exchanged forms. The sodium exchanged form was stable thermally up to 700°C. R. A. H.

**Fuchs (L. H.).** *Formation and properties of synthetic thorite crystals.* Amer. Min., 1958, **43**, 367–368.

Euhedral crystals of thorite were grown from an eutectic mixture of 55 mol.% $ThF_4$+45 mol.% $KThF_5$ ; to 0·2g of this mixture 0·11g $ThO_2$ and 0·04g $SiO_2$ were added. The sample was heated 13 days at 920°C in a sealed Monel cup in an argon atmosphere. Some properties are ; $\omega$ 1·823 pale green, $\epsilon$ 1·888 blue-green, $\pm$0·003 ; density at 25°C 6·70g/cc. $\pm$0·1 ; $a$ 7·17, $c$ 6·43Å, both $\pm$0·03Å. B. H. B.

**Foster (L. M.), Long (G.), & Stumpf (H. C.).** *Production of graphite single crystals by the thermal decomposition of aluminum carbide.* Amer. Min., 1958, **43**, 285–296, 8 figs.

Aluminum carbide, $Al_4C_3$, dissociates at atmospheric pressure (in argon) to aluminium vapor and graphitic carbon at temperatures in the range 2200–2500°C. Pure single crystals of graphite are produced. All crystals mimic the morphology of the carbide precursor: macroscopic hexagonal symmetry is lacking, curving growth lines and steps are common, twinning and cleavage are relatively rare. An interlayer spacing of 3·3545±0·0005Å at 25°C was measured; this is closely comparable with values for natural graphite. A qualitative pattern of atom shifting is suggested for the transformation of $Al_4C_3$ to graphite.

B. H. B.

**Fuchs (L. H.) & Gebert (Elizabeth).** *X-ray studies of synthetic coffinite, thorite and uranothorites.* Amer. Min., 1958, **43**, 243–248, 4 tables.

X-ray powder data are presented for synthesized coffinite ($USiO_4$) and thorite ($ThSiO_4$). Cell dimensions and X-ray densities are given for these and several synthesized uranothorites. Coffinite has $a$ 6·981±0·004, $c$ 6·250±0·005kX; thorite has $a$ 7·128±0·004, $c$ 6·314±0·003 kX; values for isostructural uranothorite are intermediate and indicate a continuous solid solution. These minerals are isostructural with zircon; their space group is $D_{4h}^{19}$—$I_4/a\,md$. The oxygen positions, determined from powder patterns, for coffinite are $u$ 0·180±0·010, $v$ 0·347±0·010; for thorite they are $u$ 0·166±0·010, $v$ 0·347±0·010. The bond distances for coffinite, thorite, and zircon are given. X-ray powder patterns of hydroxyl-containing and hydroxyl-free samples are indistinguishable. B. H. B.

**Orcel (Jean), Fauquier (Daniel), & Fö̈x (Marc).** *Données nouvelles sur la recrystallisation des minéraux métamictes.* C.R. Acad. Sci. Paris, 1955, **241**, 658–660.

Metamict betafite on heating recrystallizes to a mixture of two (or three) different mineral species which are the same whether the process is carried to, or not quite to fusion. Measurement of the energy of recrystallization cannot afford a means of attaining to the energy of metamictization (Authors' abstract). E. J. & A. S.

**Deicha (Georges).** *Dévitrification expérimentale de reliquats magmatiques inclus dans les phénocristaux de roches éruptives.* C.R. sommaire, Soc. géol. France, 1955, **5**, 34.

The tiny drops of glass enclosed in the quartz of l show a feeble recrystallization after being held at 70 for 17 to 24 hours. E. J. & A.

**Wyart (Jean).** *Cristallisation par voie hydrothermale verre naturel et origine du granite.* Sciences d Terre, Univ. Nancy, 1955, no. hors série, 177–184.

Crystallization of a granitic glass is achieved in exp ments carried out at temperatures between 300° and 60 and under high pressure in water or solutions of alka salts. An obsidian is transformed into a solid rock c posed of feldspar, mica, and quartz. In thin section rock resembles a rhyolite more than a granite, but experiments show that increase of temperature and press of the solution produces larger crystals. E. J. & A.

**Wyart (Jean).** *Synthèse d'un granite.* C.R. Acad. Paris, 1955, **241**, 1398–1399.

An obsidian of Monte Rossa, having the chem composition of granite but showing no trace of crystall tion, has been experimentally recrystallized. 7·2 g. of obsidian were treated for 120 hours at 600°C unde pressure of 2000 bars in a solution of 0 309 g. of $K_2CO_3$ 0·261 g. of KF in 19 cc. of water. The product from autoclave was a solid block showing on the sur pyramidal quartz and fine needles of a sodic amphib Thin section showed the association of feldspar and qu in a manner resembling the structure of a microgranite. E. J. & A.

**Takéuchi (Tsunehiko), Sugaki (Asahiko), & Tashiro (Chuic** *Thermal studies on the diffusion between some sulph and metallic copper in the solid phase (second rep* Sci. Rep. Tohoku Univ., Third Ser. (Min., Petr., E Geol.), 1957, **5**, 275–292, 11 figs., 2 pls.

Powdered metallic copper on heating in contact powdered pyrite in vacuo at 200° to 400°C gave rise t intermediate zone of chalcocite, bornite, and chalcopy by the diffusion of copper: pyrrhotine and chalcopy when heated in contact with metallic copper gave the s mineral assemblage [M.A. **13**–448]. R. A. I

**Sugaki (Asahiko) & Tashiro (Chuichi).** *Thermal studie the skeletal crystals of sphalerite in chalcopyrite.* Rep. Tohoku Univ., Third Ser. (Min., Petr., E Geol.), 1957, **5**, 293–304, 4 figs., 2 pls.

Skeletal sphalerite occurs in chalcopyrite in fissure

tiary tuff and mudstone at Daira mine, Akita Prefecture, an. Experiments on this and similar material from er Japanese localities showed that on heating to 480° to °C the skeletal sphalerite is absorbed into a homo- eous solid solution of sphalerite and chalcopyrite. On ling, unmixing of the sphalerite occurs most readily at peratures above 300°C. These results are taken to icate a high temperature origin for the Daria mine erial. [M.A. **2**–446, **6**–187] R. A. H.

**gwood (A. E.).** *Melting relationships of Ni–Mg olivines and some geochemical implications.* Geochim. et Cosmochim. Acta, 1956, **10**, 297–303, 2 figs.

$Ni_2SiO_4$ and $Mg_2SiO_4$ form a complete series of solid itions. In the range 50–100 wt.% $Ni_2SiO_4$ incongruent lting occurs with separation of NiO; in the range 100 wt.% $Mg_2SiO_4$ the system is binary and the peratures of both beginning and completion of melting reased with increasing Mg content. In olivines from eous rocks the Ni concentration (commonly between 50 1 500 p.p.m.) decreases as Mg in the olivine decreases; difference between magmatic and experimental aviour of Ni may be partly due to the presence of Fe the olivine (e.g. 20% Fa) which lowers the m.p. ficiently to allow Ni to enter in excess. Ni will enter olivine in Mg, Fe lattice positions but will preferentially lace Fe ions; Fe can be said to camouflage Ni.

J. R. B.

**ron (M. K.), Naeser (C. R.), Rose (H. J., *Jr.*), & Hildebrand (F. A.).** *Fractional precipitation of rare earths with phosphoric acid.* Bull. U.S. Geol. Survey, 1958, **1036–N**, 253–275.

The order of preferential precipitation in adjacent pairs lanthanide phosphates, studied by chemical, spectro- phic [M.A. **12**–345] and X-ray powder diffraction hniques, was La < Ce < Pr < Nd < Sm < Eu < Gd < Tb < < Ho < Er < Tm < Yb < Lu. Sm precipitates prefer- ially to all the lanthanides of the cerium subgroup a to Gd); Yb to all the elements of the yttrium subgroup y to Lu); Y to the following elements: Ce, Sm, Eu, and Dy (hence Y probably precipitates preferentially to the lanthanides of the cerium subgroup). Paired osphates in the cerium subgroup have the monazite ucture, those of the yttrium subgroup the xenotime ucture; and those in the interval including Gd, Tb and may have the monazite or the xenotime structure. In er experiments rhabdophane was converted to monazite, and churchite was converted to xenotime. Rhabdophane and churchite apparently are less stable than monazite and xenotime respectively. Pseudomorphism of monazite and of xenotime after rhabdophane and after churchite respectively was achieved though evidence of such pseudo- morphism has not been observed in nature. K. S.

**Neuhaus (A.) & Richartz (W.).** *Über die Einkristallzüchtung und Zustandverhältnisse von Mullit.* Ber. dtsch. keram. Ges., 1958, **35**, 108–116.

A modified water-cooled Verneuil-type crystal holder was used for growing single crystals of mullite in the range 65–80% $Al_2O_3$. Two types corresponding to $3Al_2O_3.2SiO_2$ and $2Al_2O_3.SiO_2$ obtained. X-ray data compared with those for natural sillimanite. The structure of the $2Al_2O_3.SiO_2$ form and the relationship of the two forms to the $SiO_2$–$Al_2O_3$ phase diagram are discussed. R. C. M.

[**Erlikh (E. N.)**] Эрлих (Э. Н.). О преобразовании медно-сульфидных минералов в электрическом поле. [*On the transformation of copper-sulphide minerals in the electric field*]. Зап. Всесоюз. Мин. Общ. [Mem. All-Union Min. Soc.], 1957, **86**, 445–453.

Various sulphide minerals were subjected to electrolysis, and their transformations were studied, especially with reference to oxidation products, replacement, and mobility of elements. S. I. T.

**Ivanov (B. V.), Moleva (V. A.), & Gainanova (E. I.)**] Иванов (Б. В.), Молева (В. А.) и Гайнанова (Е. И.). Об изменении кристаллического сланца при нагревании. [*On the alteration of a crystalline schist on heating.*] Изв. Акад. Наук СССР, Сер. Геол. [Bull. Acad. Sci. URSS, Sér. Géol], 1958, **5**, 60–77, 11 figs.

Actinolite-albite-epidote schist, lining a limestone kiln, developed zones of alteration. The newly formed crystals of diopside, labradorite, melilite, and other minerals are described. S. I. T.

[**Anikin (I. N.)**] Аникин (И. Н.). Искусственное получение кристаллов шеелита. [*Artificial production of crystals of scheelite.*] Зап. Всесоюз. Мин. Общ. [Mem. All-Union Min. Soc.], 1957, **86**, 459–468, 5 figs.

A review and a bibliography of methods and results of production of scheelite from solutions and melts, followed by the description of the experiments carried out by the author in crystallizing scheelite from $LiCl + CaWO_4$ melt. S. I. T.

[**Yakhontova** (**L. K.**), **Bukina** (**A. N.**), & **Raudonis** (**P. A.**)]. Яхонтова (Л. К.), Букина (А. Н.) и Раудонис (П. А.). Растворимость некоторых арсенидов кобальта и никеля в сернокислой среде. [*Solubility of certain arsenides of cobalt and nickel in a sulphuric acid medium*] Зап. Всесоюз. Мин. Общ. [Mem. All-Union Min. Soc.], 1958, **87**, 23–30, 1 fig.

Smaltite, safflorite, and niccolite have been treated with a weak solution of sulphuric acid, and the products of reaction and the relative leaching of different elements are described. S. I. T.

**Robertson** (**Eugene C.**), **Birch** (**Francis**), & **MacDonald** (**Gordon J. F.**). *Experimental determination of jadeite stability relations to* 25,000 *bars.* Amer. Journ. Sci., 1957, **255**, 115–137, 9 figs.

The synthesis of jadeite has been accomplished at a variety of different pressures and temperatures and the position of the $PT$ curve for the reaction albite + nepheline = 2 jadeite has been determined. The apparatus is described and in this study it has been used up to a pressure of 25,000 bars at a temperature of 1,350°C. The experimentally determined $PT$ curve is in fairly good agreement with the curve calculated from thermochemical data. The breakdown of feldspars and feldspathoids at high pressures to form high-density minerals at depth provides an alternative explanation for the Mohorovičić discontinuity : thus instead of the discontinuity being due to a chemical boundary it may be entirely a physical discontinuity. [M.A. **11**–145, 491, **12**–198, **13**–267] W. S. M.

**Clark** (**Sydney P.**, *Jr.*). *A note on calcite-aragonite equilibrium.* Amer. Min., 1957, **42**, 564–566, 1 fig.

Determination of the calcite–aragonite equilibrium curve between 400° and 575°C and for 10,000 to 13,200 bars, using an apparatus in which the pressure is truly hydrostatic [see preceding abstract], gave results in agreement with those of Jamieson [1953]. The curve is parallel to MacDonald's curve [M.A. **13**–177], determined using the "simpler squeezer" type of apparatus, but departs from it towards higher pressures by about 1,300 bars. R. A. H.

**Ferguson** (**R. B.**). *The crystallography of synthetic* $YTaO_4$ *and fused fergusonite.* Canadian Min., 1957, **6**, 72–77.

A minute fragment of synthetic $YTaO_4$, produced at roughly 2,100°C, gave single-crystal X-ray photographs indicating monoclinic rather than tetragonal symmetry [M.A. **3**–346], with $a$ 5·34, $b$ 10·94, $c$ 5·07Å, β 95·3°, proba space group $I2/a$, $Z=4$, $D$ (calc.) 7·47g/cc. : the index powder reflections are given. The X-ray powder patte of natural fergusonite fused at the same high temperatu is essentially the same as that of the synthetic YTa and it is suggested that fergusonite may be only pseud tetragonal. [M.A. **2**–36, **13**–260, **14**–54] R. A. H

**MacKenzie** (**W. S.**). *The crystalline modifications* $NaAlSi_3O_8$. Amer. Journ. Sci., 1957, **255**, 481–516

Albites crystallized from glass of composition $NaAlSi_3$ in the presence of water vapour at temperatures varyi from 450°C to 1,000°C show wide variation in latt parameters, measured by change in $2\theta_{131}$—$2\theta_{1\bar{3}1}$. Runs varying duration show that the lattice parameters albite crystallizing under fixed conditions of temperatu and water-vapour pressure change with time, and eventua attain a steady value characteristic of the temperatu Steady values for temperatures between 1,000°C and 600 are intermediate between those of high-temperature alb and low-temperature albite. Steady values were n obtained for temperatures below 600°C, possibly beca the most extended runs were still too short. Variation water vapour pressure between 7,000 lb/in² and 35,0 lb/in² has no significant effect on the values obtained. It suggested that for each temperature there is a sta crystalline form of $NaAlSi_3O_8$ intermediate between hi and low-albite. Some natural albites, not of the lo temperature form, may have crystallized metastably in high- or intermediate-temperature form and gradua inverted to the low-temperature form. The properties the pericline variety of albite from low-temperature ve of Alpine type are consistent with this interpretation G. D. N

**Flaschen** (**S. S.**) & **Osborn** (**E. F.**). *Studies of the sys iron oxide–silica–water at low oxygen partial pressu* Econ. Geol., 1957, **52**, 923–943, 7 figs.

The stability relations of fayalite, greenalite, and min sotaite have been investigated at low partial pressures oxygen and high water pressures. Iron-silicon all reacting with water give oxide phases and hydrogen. T total pressure, varied over the range 2,500 to 17,500 lb was found to have little effect on the temperatures reactions. Greenalite, obtained as an intermediate prod in the decomposition of minnesotaite, was comple replaced by fayalite and silica in longer experiments. a constant $Fe : SiO_2 : H_2O$ ratio at constant tempera

increase in partial pressure of oxygen could change the emblage magnetite + greenalite to magnetite + greene + minnesotaite, to magnetite + minnesotaite, to gnetite + minnesotaite + quartz, and finally to magne- + quartz. On the other hand for a constant $SiO_2 : H_2O$ ratio at constant oxygen pressure, an rease in temperature could change the assemblage gnetite + greenalite to greenalite + fayalite, to fayalite ninnesotaite, and to fayalite + quartz. The mineral emblages of the Lake Superior iron formations are ussed in relation to this study. W. S. M.

**sserburg (G. J.).** *The effect of $H_2O$ in silicate systems.* Journ. Geol., 1957, **65**, 15–23, 3 figs.

A theoretical explanation is given of the depression of melting point of albite and the solubility of water in silicate melt for the system $NaAlSi_3O_8$–$H_2O$. It is wn that these two relations are governed to a good roximation by the perfect solution law, the solution ng between oxygen atoms in the water and the bridging gen atoms in the silicate [M.A. **7**–34]. W. S. M.

**an (Arnulf).** *Phase equilibrium relationships at liquidus temperatures in the system $FeO$–$Fe_2O_3$–$Al_2O_3$–$SiO_2$.* Journ. Amer. Ceram. Soc., 1957, **40**, 420–431, 12 figs.

The standard quenching technique is used to study ctures in the system $FeO$–$Fe_2O_3$–$Al_2O_3$–$SiO_2$. The ume located between the 1 and 0·2 atm. $O_2$ isobaric faces of the tetrahedron representing this system is died in detail. Results are combined with data from literature to construct a phase equilibrium diagram at uidus temperatures for the system. P. K. H.

**an (Arnulf).** *Phase equilibria at high temperatures in oxide systems involving changes in oxidation states.* Amer. Journ. Sci., 1958, **256**, 171–207.

The basic theory and experimental procedures used to dy phase equilibrium in oxide systems containing ments with different valence states are described. Such tems differ from the commoner oxide equilibrium grams chiefly in the fact that the $O_2$ partial pressure n additional important variable. The principles govern- interpretation of phase equilibrium diagrams are illustrated by reference to the systems Fe–O, $FeO$–$Fe_2O_3$–$SiO_2$, and $MgO$–$FeO$–$Fe_2O_3$–$SiO_2$. R. R.

**Muan (Arnulf).** *Phase equilibria at liquidus temperatures in the system iron oxide–$Al_2O_3$–$SiO_2$ in air atmosphere.* Journ. Amer. Ceram. Soc., 1957, **40**, 121–133, 10 figs.

Liquidus temperatures obtained by the quenching technique are given for mixtures in the system iron oxide–$Al_2O_3$–$SiO_2$ in an air atmosphere. The crystalline phases which exist in equilibrium with liquid are : cristobalite, tridymite, mullite, spinel, and corundum. Infra-red absorption spectra proved useful for the distinction of mullite and sillimanite. P. K. H.

**Ringwood (A. E.).** *Olivine-spinel transition in fayalite.* Bull. Geol. Soc. America, 1958, **69**, 129–130.

The transition from fayalite to a high-pressure polymorph was placed at 45,000 bars at 400°C from runs made at 400°C and 20, 30, 38, 50, and 60 kilobars on a " squeezer " type apparatus. The high-pressure polymorph has refr. ind. 1·955 ± ·020, a spinel structure with lattice constant of 8·235Å, and calculated density of 4·85 g/cc, 12% higher than that of fayalite. The transition pressure predicted for the same temperature is well within the combined margins of error of the methods used. A. L. A.

**Brisi (Cesare).** *Role of cuspidine ($3CaO.2SiO_2.CaF_2$) in the system $CaO$–$SiO_2$–$CaF_2$.* Journ. Amer. Ceram. Soc., 1957, **40**, 174–178, 3 pls., 2 figs.

Reactions in crystalline mixtures of $CaF_2$, $CaSiO_3$, and $Ca_2SiO_4$ easily produce crystallization of cuspidine. It is stable to the fusion point (slightly above 1400°C). Above 1450°C it decomposes to form $CaF_2$ and larnite. [A.M. **43**–1195] P. K. H.

**McCune (S. E.), Greaney (T. P.), Allen (W. C.), & Snow (R. B.).** *Reaction between $K_2O$ and $Al_2O_3$–$SiO_2$ refractories as related to blast furnace linings.* Journ. Amer. Ceram. Soc., 1957, **40**, 187–195, 5 pls., 1 fig.

Mixtures of crushed brick and $K_2CO_3$ show the formation of leucite and kaliophilite below 1700°F. Six chemical analyses of brick with mullite, kaliophilite, cristobalite, and adularia are given, as well as X-ray diffraction data for adularia in furnace brick. P. K. H.

## GEMSTONES

**yne (C. J.).** *An alexandrite crystal from Burma.* Gemmologist, 1956, **25**, 39–40, 3 figs.

An alexandrite crystal was found in the stone tract of Mogok, Upper Burma, a locality not considered a usual source for this gem. Refr. ind. $\alpha$ 1·7463, $\beta$ 1·7484 and $\gamma$ 1·7548 ; sp. gr. 3·706. A list of the absorption bands is given. G. F. A.

[**Burov** (**A. P.**) & **Sobolev** (**V. S.**), Scientific Editors]. Буров (А. П.) и Соболев (В. С.), научные редакторы. Алмазы Сибири. [*The Siberian diamonds.*] Гос. научно-техн. изд. [State Sci.-Techn. publ.], 1957, 159 pp., 193 figs, 1 map. Price **14r. 85k.**

This is a finely produced book on newly discovered diamonds in the Yakutian province of Siberia. It is written by a number of members of the geological survey expedition through whose efforts the diamond deposits were discovered in 1954, but neither their names, nor those of the editors appear on the title page. The diamantiferous province of Siberia occupies a very extensive territory situated between the rivers Yenisei and Lena, but the present book deals with the basin of the river Vilui, where the principal diamond-bearing kimberlite pipes are located. The chapters are as follows :— I. Geology of the kimberlite pipes. II. Petrology of kimberlites. III. Mineralogy of kimberlites. IV. Mineralogy of diamonds. V. Placer deposits. VI. Methods of prospecting. VII. Geophysical methods of prospecting. The minerals of kimberlites are described in great detail, including optical and chemical data, and special attention is paid to the crystal morphology, structure, colour, and other properties of the diamonds. The book is provided with numerous illustrations including maps, sections, diagrams, and reproductions of photographs of rocks and minerals, many of them in colour.

S. I. T.

**Leiper** (**H.**). *Arkansas diamonds.* Journ. Gemmology, 1957, **6**, 63–71, 4 figs.

Diamonds occur in a peridotite breccia in the Prarie Creek area of Pike County, Arkansas, and have been discovered spasmodically in the area for about fifty years. A stone found in 1956, of exceptional clarity and quality, weighed 15·31 carats. When cut into a marquise-shaped gem, of 8·27 carats, it was given the name " Star of Arkansas ". Other occurrences of diamond in North America are briefly mentioned. G. F. A.

[**Grum-Grzhimailo** (**S. V.**)] Грум-Гржимайло (С. В.). Окраска самоцветов. [*The colour of precious stones.*] Зап. Всесоюз. Мин. Общ. [Mem. All-Union Min. Soc.] 1958, Ser. 2, **87**, 129–150, 6 pls.

A correlation between structure, presence of certain ions, and coloration of a number of precious stones is made. In certain cases light absorption curves are given. S. I. T.

**Thilo** (**E.**), **Jander** (**J.**) & **Seeman** (**Hans**). *Die Farbe des Rubins und der* $(Al,Cr)_2O_3$*–Mischkristalle.* Zeits. anorg. allgem. Chem., 1955, **279**, 2–17, 7 figs.

Mixed crystals of $Al_2O_3$–$Cr_2O_3$ are pure red in colour to about 8 mol.% $Cr_2O_3$ above which the green colour d to $Cr_2O_3$ begins to appear. Values are given for the c size and density for 22 compositions in the series : pu $Al_2O_3$ has *a* 4·745, *c* 12·93, sp. gr. 3·975. R. A. H.

**Schlegel** (**Dorothy M.**). *Gem stones of the United Stat* Bull. U.S. Geol. Surv., 1957, **1042–G**, 203–253.

Following a brief introduction and mention of physi properties, nomenclature, gem cuts, and synthetic a imitation stones, a semi-popular account is given of vario precious and semi-precious stones and their occurrence the United States. The geographical distribution of t principal gemstones is given by States and counties. T occurrences of other minerals sometimes used as gemstor are also listed including such material as amber, boweni catlinite, variscite, and williamsite, all varieties of idocra apparently being described as californite. R. A. H.

**Foshag** (**W. F.**). *Chalchihuitl—a study in jade.* Am Min., 1955, **40**, 1062–1070.

The Aztec gemstone chalchihuitl is jadeite or the relat minerals diopside-jadeite and chloromelanite. The vario categories recognised by the Aztecs are identified and t occurrence of chalchihuitl in association with the serp tinite of Guatemala is suggested. New analyses by Fahey are of jadeite (A) " Blue jade " from Mexic jadeite (B) from pea green coloured celt, Guatema jadeite (C) from jade worker's tomb, Kaminalju Guatemala ; diopside-jadeite (D), rough fragment fr tomb, Kaminaljuvu, Guatemala ; and chloromelanite from greyish green celt, Guatemala.

| | $SiO_2$ | $Al_2O_3$ | $Fe_2O_3$ | FeO | MgO | CaO | $Na_2O$ | $K_2O$ | $H_2O$ | Tots |
|---|---|---|---|---|---|---|---|---|---|---|
| A | 59·35 | 22·18 | 1·15 | 0·32 | 1·77 | 2·57 | 12·20 | 0·20 | 0·20 | '100· |
| B | 58·12 | 20·32 | 2·49 | 0·77 | 2·16 | 3·13 | 12·43 | 0·10 | 0·16 | 100+ |
| C | 58·26 | 22·23 | 0·71 | 0·21 | 2·18 | 3·72 | 11·91 | 0·40 | 0·44 | 100+ |
| D | 56·28 | 12·18 | 0·85 | 1·28 | 9·02 | 12·60 | 6·94 | 0·25 | 0·30 | '99· |
| E | 57·39 | 18·93 | 4·45 | 0·81 | 1·92 | 2·74 | 12·46 | 0·11 | 0·54 | 99· |

and also : A, $TiO_2$ 0·18, MnO 0·01 ; B, $TiO_2$ 0·31, $Cr_2O_3$ 0·01, MnO 0·07 ; C, $TiO_2$ $Cr_2O_3$ none, MnO 0·03 ; D, $TiO_2$ 0·03, $Cr_2O_3$ none, MnO 0·13 ; E, $TiO_2$ 0·44, $Cr_2O_3$ MnO 0·09.

[M.A. **2**–67, **11**–145, 486, **12**–381, 578.] R. A. H.

**Gübelin** (**E. J.**). *Emerald from Habachtal.* Journ. G mology, 1956, **5**, 342–361, 14 figs.

Habachtal, in the Salzburg Alps, Austria, is the o known European source of emerald. The mines have b worked spasmodically since Roman times. Access to th is difficult and climatic conditions make working ardu Detailed investigation of the deposit showed it to b

ssical example of emerald formation in biotite schist. e emeralds enclose considerable impurities and sp. gr. is '2—2·76. Specimens tested gave ω 1·591, ε 1·584. emolite, biotite, and apatite were found as included nerals. The colour of the gems is very beautiful, but en impaired by the numerous inclusions. Output is nited. G. F. A.

**pler (W. F.).** *Notes on asterism in corundum, rose quartz and almandine garnet and chatoyancy in beryl.* Journ. Gemmology, 1958, **6**, 195–212, 21 figs.

The physical conditions necessary for the appearance of terism are discussed and it is stated that chatoyancy is ie to the conical reflection of light on very fine, thin, ngated inclusions which are orientated parallel to each her and which follow only one direction : for asterism the ngated inclusions must be thin enough to produce the nical reflection of light in a similar way to its manner production on very thin cylinders. Star-sapphire and ar-ruby are caused by regularly included needles of rutile : nthetic star-corundum is also discussed. The asterism in se quartz is due to rutile needles, in almandine garnet hornblende needles, while for beryl the cause lies in a twork of ilmenite inclusions [M.A. **12**–597]. R. A. H.

**Eppler (W. F.).** *Notes on asterism in spinel and chatoyancy in chrysoberyl, quartz, tourmaline, zircon and scapolite.* Journ. Gemmology, 1958, **6**, 251–263, 26 figs.

Asterism in some Ceylon spinels is caused by oriented rutile needles but other unidentified doubly refracting crystal fibres with a lower refractive index are also found : inclusions of sphene are often present but are too sparsely distributed to cause asterism. Burma spinels do not show asterism but have liquid inclusions and black birefringent crystal inclusions with apparently hexagonal symmetry. In specimens of chrysoberyl and tourmaline the chatoyancy is ascribed to small doubly refracting needles of a material of higher refr. ind. than that of the host, arranged parallel to the *c* axis, rather than to the hollow channels of previous authors. R. A. H.

**Tilley (C. E.).** *On the replacement of anorthosite by hydrogrossular in the Transvaal.* Trans. Geol. Soc. South Africa, **60**, for 1957, 15–17, 1 pl.

The mode of occurrence of "South African Jade" suggests that it is due to replacement of the plagioclase of anorthosite. A pink variety has been analysed with 4·47 per cent. water, *n* 1·675–1·705, sp. gr. 3·27 and cell size 11·90Å, corresponding to hydrogrossular. E. D. M.

## GEOCHEMISTRY

**aw (D. M.).** *The nature and some results of geochemistry.* Proc. Geol. Assoc. Canada, 1954, **6**, 87–96.

The scope, aims, history, and modern status of geoemistry are briefly defined. W. E. H.

**awkes (H. E.).** *Principles of geochemical prospecting.* Bull. U.S. Geological Survey **1000–F**, 1957, iv + 131 pp., 13 tables. Price 40 cents (paper cover).

This report is primarily a review of the more important ochemical principles involved in the evolution of geoemical anomalies, together with a section on the historical velopment and application of geochemical methods of rospecting. Geochemical anomalies are divided into (1) rimary anomalies resulting from apparent local variation the original composition of the earth's crust defining a istinctive "geochemical province" favourable for the currence of ore, from impregnation of rocks by mineralizg fluids relating to ore formation, and from dispersion volatile elements transported in gaseous form; and (2) condary anomalies of superficial origin arising from residual material from weathering in place or as material dispersed by gravity, ice, or moving water. This secondary dispersion is determined by the mobility of an element; since water is the principal transporting agent for weathering products, the chemical factors affecting the mobility of elements, such as pH, solubility of salts, coprecipitation, sorption, eH, and the formation of complexes and colloidal solutions, are considered. Suggestions are made for a sampling programme, and sampling and analytical techniques are enumerated. This most useful review of a subject which has developed rapidly in the last twenty years is concluded with a glossary, tables listing various units of measurement, and 275 references. R. A. H.

**Nicholls (G. D.).** *Sedimentary geochemistry : a possible future method for correlation of strata.* Petroleum, 1958, **21**, 316–320, 324, 8 figs.

The results of some recent research are outlined, with special reference to the distribution of trace elements in both the detrital and non-detrital fractions of a thin layer

of sediment across a basin of deposition and to the effect of weathering and diagenesis on trace element content. It is suggested that the prospects of evolving a geochemical method of strata correlation are encouraging and justify further investigations into the geochemistry of sedimentary rocks. R. A. H.

**Degens (E. T.), Williams (E. G.), & Keith (M. L.).** *Environmental studies of Carboniferous sediments. Part I. Geochemical criteria for differentiating marine from fresh-water shales.* Bull. Amer. Assoc. Petrol. Geol., 1957, **41**, 2427–2455.

Determinations of trace element values and clay mineral ratios in shales from the Appalachian coal basin show that B and Rb are more, Ga less abundant in marine than in fresh-water shales of Pennsylvanian age. The illite : kaolinite ratio tends to be higher in the former, illite being probably authigenic as well as detrital, while in fresh-water shales it is probably mainly detrital. Organic fractions show concentration of Ni and V in the marine, Pb, Zn, Cu, and Sn in the fresh-water shales. Differentiation of marine from fresh-water shales by quantitative determination of B, Ga, and Rb is attempted. G. D. N.

[**Ginzburg (I. I.)**] Гинзбург (И. И.). Основные результаты изучения древних кор выветривания в СССР. [*Fundamental results of the study of the ancient crusts of weathering in the USSR.*] Изв. Акад. Наук СССР, Сер. Геол. [Bull. Acad. Sci. URSS, Sér. Géol.], 1957, no. **12**, 61–68.

This is a comprehensive review of recent Russian work on the ancient crusts of weathering, comprising the classification of the deposits, processes, nature of zones. Associated deposits of kaolinite, bauxite, and iron ore are discussed. The processes of evolution and the geochemistry of the zone of weathering are examined and a bibliography of 70 items is appended. S. I. T.

**Oftedal (Ivar).** *Some observations on the regional distribution of lead in South Norwegian granitic rocks.* Norsk Geol. Tidsskr., 1954, **33**, 153–161.

From results based on relatively few spectrochemical analyses of alkali feldspars it is concluded that granitic rocks in gneiss areas of Southern Norway are in general fairly rich in Pb, while those of the Oslo Region are extremely poor in Pb in spite of the occurrence of galena in their contact deposits. It is concluded that alkali feldspars may incorporate appreciable amounts of Pb o at the relatively low temperatures of crystallization assum to be characteristic of anatectic granites. I. W. O

**Morris (D. F. C.).** *The association of nickel with cinnab* Geochim. et Cosmochim. Acta, 1956, **10**, 322–323.

Preliminary studies show that Ni is detected at ab 2 p.p.m. in 9 of 13 samples of cinnabar. This associat supports an alkaline sulphide derivation for cinnabar rat than a vapour phase (metal, sulphide, or chlori derivation. J. R. B

**Shaw (Denis M.).** *Comments on the geochemical implicati of lead-isotope dating of galena deposits.* Econ. Ge 1957, **52**, 570–573.

Recent work on lead isotopic ratios in galena has indica that most lead deposits come from a common source wh U/Pb and Th/Pb ratios have changed during geolog time only as a result of radioactive decay. The assu tions that this source was established during the origin the earth and that the source lies in the mantle rather t the crust are believed to be based on insufficient evide R. A. H

**Wedepohl (Karl Hans).** *Untersuchungen zur Geochemie Bleis.* Geochim. et Cosmochim. Acta, 1956, 69–148, 1 fig.

A distillation double-arc spectrographic method is u to estimate Pb to 1 p.p.m. using Bi as internal standa more than half (approx. 250) of the data discussed are n Basic igneous rocks are poorer in Pb than acidic, 3–6 p.p Pb for ultrabasic and basic, 15–20 p.p.m. Pb for gra dioritic and granitic rocks. Feldspars carry the bul the Pb but ferromagnesian minerals may contain signific amounts, e.g. pyroxenes 6 p.p.m., amphiboles 15 p.p and biotites 25 p.p.m. Pb ; olivine is relatively low. tends to follow K in minerals ; during magmatic dif entiation both K/Pb and Ba/Pb tend to increase excep some late stage minerals. In sediments Pb is concentra in the clay fraction. J. R. I

**Ostrom (Meridith, E.).** *Trace elements in Illinois Pe sylvanian limestones.* Illinois State Geol. Surv., 1 circ. **243**, 34 pp., 4 figs.

The results of spectrochemical analyses for B, Ba, Cr, Fe, K, Mn, Mo, Na, Ni, Pb, Sr, Ti, V, and Zn in ninety- samples of limestone of Pennsylvanian age in thirty-

nois quarries are tabulated. Seventeen specimens of les associated with the limestones were also examined. R. A. H.

**gel (Celeste G.) & Sharp (Robert P.).** *Chemical data on desert varnish.* Bull. Geol. Soc. America, 1958, **69**, 487–518, 10 figs., 4 pls.

Desert varnish forms a dark coating up to 0·10 mm thick many stones and outcrops in southern California deserts. alyses of varnish, the underlying weathered rind, and sh rock (one rhyolite and two andesites) show that the in elements in varnish are O, H, Si, Al, Fe, and Mn, the t two giving the deposit its distinctive character, and t $H_2O$, $Fe_2O_3$, and especially MnO are enriched. Field servations and partial analyses indicate that the best rnishes are on fine-grained rocks relatively rich in Fe and . Spectrographic analyses of 22 varnishes, 14 rocks, 8 ls, and 5 samples of air-borne material, show Ti, Ba, and by far the most abundant trace elements in varnish, lowed by Cu, Ni, Zr, Pb, V, Co, La, Y, B, Cr, Sc, and . Cd, W, Ag, Nb, Sn, Ga, Mo, Be, and Zn were recorded some but not all varnishes. The variations recorded are ated to differences in the local geology. Most trace ments are considerably enriched in varnish—Cu and Co ecially. [M.A.**11**–552] A. L. A.

**ito (Iwao) & Abe (Masahiro).** *The non-hydrocarbon constituents of the resource rocks of petroleum.* Sci. Rep. Tohoku Univ., Third Ser. (Min., Petr., Econ. Geol.), 1957, **5**, 325–334, 2 figs.

The results of semi-quantitative spectrographic analyses trace elements in 166 samples of Miocene sediments and er-stratified pyroclastics from the oil-bearing Shinjo oup, Yamagata Prefecture, Japan, are tabulated. The atigraphical interpretation of the results is difficult, but me elements are characteristically detected in certain rizons. R. A. H.

**eda (Yoshio).** *Spectrographic studies on the trace elements in the granitic rocks from the Northern Honshu and the Ashio mountainblock.* Sci. Rep. Tohoku Univ., Third Ser. (Min., Petr., Econ. Geol.), 1957, **5**, 225–274, 20 figs., 10 pls.

The results of semi-quantitative analyses for trace ments in several hundred Japanese granitic rocks are bulated and discussed. New chemical analyses are given nine granodiorites and granites from the northern Abukuma mountains, Fukushima Prefecture, and for six samples of the Sori granodiorite from Ashio mountainblock, central Japan. R. A. H.

**Smales (A. A.).** *Some trace-element determinations in G–1 and W–1 by neutron activation.* Geochim. Cosmochim. Acta, 1955, **8**, 300.

Concentrations of Au, Co, Cu, Ni, Pd, and Rb are given for the rocks G–1 and W–1. J. R. B.

**Faust (George T.), Murata (K. J.), & Fahey (Joseph J.).** *Relation of minor-element content of serpentines to their geological origin.* Geochim. Cosmochim. Acta, 1956, **10**, 316–320, 1 fig.

Data are given for the concentration of B, Co, Cr, Cu, Mn, Ni, Sc, and Ti in serpentines from (i) ultrabasic rocks (9 localities), and (ii) rocks including metamorphosed limestones and dolomites (11 localities but no rock descriptions). Ni is invariably, and Co, Cr, and Sc usually higher in (i) than in (ii). The reverse tendency is shown by B. J. R. B.

**Patterson (E. M.) & Swaine (D. J.).** *A petrochemical study of Tertiary tholeiitic basalts: The Middle Lavas of the Antrim Plateau.* Geochim. et Cosmochim. Acta, 1955, **8**, 173–181, 1 fig.

Chemical analyses of petrologically similar basalts occurring as flows in the Middle Lava series of the Antrim Plateau show that basicity (measured from Fe : Mg relationship) increases and K and K : Na decrease in the middle flows of the series. Spectrographic data show that Rb and Ba reflect the K trend and Co and Ni reflect the Mg trend; Cu and Cr vary sympathetically. Average values for Ga, Pb, Sr, V, and Y are appreciably lower than those reported in an earlier paper for these lavas. [M.A. **12**–33] J. R. B.

**Vlassov (K. A.).** *Les différénciations par émanations et par crystallization comme facteurs de concentration des éléments rares.* Sciences Terre, Univ. Nancy, 1955, No. hors série, 197–208.

Two empirical rules are formulated and applied to the alkaline and pegmatitic rocks: (1) concentration of Li, Be, Cs, Ta, and rare earths takes place in the upper parts of the alkaline and granitic intrusions, proving the part played by volatiles in the process; (2) their concentration is related to well-differentiated facies of the intrusions (monomineralic layers due to differential crystallization).

The author shows by examples how the two interdependent factors of volatiles and differential crystallization comprise all the factors influencing formation of the minerals (among others, pressure, temperature, and chemical composition).

E. J. & A. S.

[**Beus** (**A. A.**)] Беус (А. А.). К геохимии бериллия в гранитных пегматитах. [*On the geochemistry of beryllium in granite pegmatites.*] Изв. Акад. Наук СССР, Сер. Геол. [Bull. Acad. Sci. URSS, Sér. Géol.], 1957, no. **8**, 3–15, 2 figs.

The distribution of beryllium in pegmatites is discussed in the light of the processes of its migration during the successive stages of pegmatite development. S. I. T.

[**Ginzburg** (**A. I.**)] Гинзбург (А. И.). Некоторые особенности геохимии лития. [*Certain features of the geochemistry of lithium.*] Труды Минер. Муз. Акад. Наук СССР [Trans. Min. Mus. Acad. Sci. USSR], 1957, **8**, 29–41, 1 fig.

Lithium in the earth's crust is associated with Na, F, Be, B, and He, but in silicates it replaces Mg, Fe, and Al. Two stages of formation of lithium minerals in pegmatites are distinguished and lithium metasomatism leads to the formation of a "lithium aureole" around pegmatites and hydrothermal bodies. Four types of lithium mineralization, and hypogene processes involving lithium are discussed.

S. I. T.

[**Borovik-Romanova** (**T. F.**) & **Sosedko** (**A. F.**)] Боровик-Романова (Т. Ф.) и Соседко (А. Ф.). О содержаниях рубидия в бериллах пегматитовых жил Кольского полуострова. [*On the content of rubidium in the beryls of pegmatite veins of the Kola peninsula*]. Доклады Акад. Наук СССР [C. R. Acad. Sci. URSS], 1958, **118**, 534–536.

Spectroscopic determination shows the presence of $3{\cdot}3\times10^{-3}$ to $110\times10^{-3}$ per cent. of Rb in beryls. It is considered that Rb and K are replacing caesium. S. I. T.

[**Aleksin** (**A. A.**)] Алексин (А. А.). О зональном распределении кальцита в почвахи грунтах делты р. Аму-Дарьи. [*Zonal distribution of calcite in soils and deposits of the Amu-Darya delta*]. Почвоведение [Pedology], 1958, no. **2**, 54–57, 2 tables, 1 fig.

Analyses of the water of the Amu-Darya (Uzbekistan) over a year gave (in mg/l.) Ca 51·3–84·5, Mg 11·2–28·2, Na+K 9·9–80·3, $HCO_3$ 94·6–148·3, $SO_4$ 79·0–195·9, Cl 39·1–126·9. Calculated salt composition shows increase in NaCl and $MgSO_4$ and decrease in $CaSO_4$, $Ca(HCO_3)_2$, and $MgCl_2$ in winter compared to summer. The $CaCO_3$ content of the soils and flood deposits decreases with distance from present delta. R. C. M

**White** (**Donald E.**). *Thermal waters of volcanic ori* Bull. Geol. Soc. America, 1957, **68**, 1637–1658, 5 fig

Examination of waters from hot-spring groups particul high in temperature and heat flow, associated with Tertiary or Quaternary vulcanism, commonly sh dominance of sodium chloride. Isotopic evidence indic that water of direct volcanic origin probably forms more than five per cent. of the water. Factors belie to affect the composition of volcanic waters are : the t of magma, stage of crystallization, temperature and press of the emanation, nature and abundance of admi meteoric water, and reactions with the wall rocks. volcanic sodium chloride waters the high ratio of L Na and K is taken to indicate that alkalis were transpo as alkali halides dissolved in a dense vapour : the de of circulation of meteoric waters is about two miles. is concluded that the common sodium chloride waters the diluted product of high-density emanations, modi by reaction with wall rocks and by precipitation of less soluble components. Six new analyses of waters f hot springs are presented. [M.A. **12**–387] R. A. I

**Wood** (**John A.**, *Jr.*). *The solubility of quartz in wat high temperatures and pressures.* Amer. Journ. 1958, **256**, 40–47.

A theoretical equation for solubility of quartz in su critical steam uses chemical potentials derived by statis mechanics, and the experimental data of G. C. Kenn up to 580° and 1750 bars and extrapolated to 800° 2500 bars, where the solubility is 1·7%. H. W

**Krauskopf** (**Konrad B.**). *Dissolution and precipitatio silica at low temperatures.* Geochim. Cosmoc Acta, 1956, **10**, 1–26, 2 figs.

The solubilities of the different forms of silica are g with the caveat that at low temperatures the rat solution (or precipitation) is slow on a laboratory scale. The solubility of amorphous silica is sca dependent on pH in the range 0–9 but increases mark when the pH exceeds 9. Dissolved silica is almost ent in the form of the monosilicic acid, $H_4SiO_4$, to give a solution (and not a colloidal solution) which is unaff by either electrolytes or other colloids. Thus silica in stream waters is in true solution and is not precipit on contact with sea water. Consequently chert ca have been formed in marine sediments by inor precipitation. J. R.

# HISTORY AND BIOGRAPHY

**tner** (**Radim**) & **Zhak** (**Lubor**)] Кеттнер (Радим) и Жак (Лубор). Памяти Франтишека Славика [*To the memory of Frantisek Slavík.*] Зап. Всесоюз. Мин. Общ. [Mem. All-Union Min. Soc.], 1957, **86**, 104–112.

ife, work, and selected bibliography of F. Slavík 6–1957). S. I. T.

**nk-Kamenetzky** (**V. A.**) & **Tatarsky** (**V. B.**)] Франк-Каменецкий (В. А.) и Татарский (В. Б.). Осип Маркович Аншелес. [*Osip Markovich Ansheles.*] Зап. Всесоюз. Мин. Общ. [Mem. All-Union Min. Soc.], 1957, **86**, 736–743, 1 fig.

Life, work, and bibliography of O. M. Ansheles (1885–1957). S. I. T.

[**Anon.**]. Александр Антонович Твалчрелидзе. [Alexander Antonovich Tvalchrelidze]. Зап. Всесоюз. Мин. Общ. [Mem. All-Union Min. Soc.], 1957, **86**, 743–746, 1 fig.

Life, work, and bibliography of A. A. Tvalchrelidze (1881–1957). S. I. T.

# METEORITES AND TEKTITES

**ssalskaya** (**K. P.**)] Массальская (К. П.). Библиографический указатель литературы по метеоритике. Выпуск 5 (1955 г.). [*Bibliographical index of the literature on meteorites, No.* 5 (1955).] Метеоритика, Акад. Наук СССР [Meteoritica, Acad. Sci. USSR], 1958, **16**, 181–208.

ontinuation [M.A. **12**–241 ; **13**–43, 354]. Under 57 ject headings are listed 325 titles of papers in the original uages with short annotations. This is followed by an x of meteorites and one of authors and subjects. L. J. S.

**ssalskaya** (**K. P.**)] Массальская (К. П.). Международные организации по метеоритике. Метеоритика, Акад. Наук СССР, 1958, **15**, 180–182. Abstract : *International organizations on meteorites.* Supplement to Meteoritica, Acad. Sci. USSR, 1957, **15**, 10.

t the 18th session of the International Geological gress held in 1948 in London a Permanent Commission Meteorites was inaugurated, on the proposal of Prof. Wahl of Finland. At the 19th session (1952) at Algiers move was made, but at the 20th session (1956) in ico, further discussion produced a definite programme. Campbell Smith was elected President, and F. Heide, L. Krinov, and H. C. Urey as Vice-Presidents, with H. Hey as Secretary. In the meantime, in 1955, an pendent sub-committee on meteorites had been set up the 9th meeting in Dublin of the International onomical Union.

ince then, type-written copies of 'The Meteoritical etin' (No. 1, February, 1957—No. 12, January, 1959) ng information on new meteorites, have been sent from Moscow to members of the permanent commission by the energetic vice-president Krinov.] L. J. S.

[**Krinov**] **Krinow** (**E. L.**). 7, *Meteoritenkonferenz in der USSR.* Chem. Erde, 1957, **19**, 86–110.

[**Fesenkov** (**V. G.**)] Фесенков (В. Г.). Успехи метеоритики. Метеоритика, Акад. Наук СССР, 1958, **16**, 5–10. Abstract : *Progress in meteorites.* Supplement to Meteoritica, Acad. Sci. USSR, 1958, **16**, 3–5.

The seventh conference, called by the meteorite committee U.S.S.R., was held in Moscow on 14–17 November, 1956, and was attended by about a hundred persons, including three delegates from Germany, Poland, and Bulgaria. Reports are given of the many papers presented and discussed. New meteorites are : *Gressk* (Гресск, Hressk).—Minsk, found July, 1955, hexahedrite, 303 kg. *Zvonkov* (Звонков, Svonkovje).—Village 40 km. from Kiev, fell after detonations at 3.45 p.m. on 2 September, 1955, chondrite ; two stones (1·296 and 1·272 kg.) were found 4 km. apart. L. J. S.

[**Massalskaya** (**K. P.**)] Массальская (К. П.). Метеоритные учреждения Соединенных Штатов Америки. Метеоритика, Акад. Наук СССР, 1958, **15**, 183–189, 2 figs. Abstract : *The meteoritical institutions of the U.S.A.* Supplement to Meteoritica, Acad. Sci. USSR, 1957, **15**, 10.

Notes on : H. H. Nininger's meteorite museum in Arizona ; the Meteoritical Society ; Institute of Meteoritics in the university of New Mexico ; publications. L. J. S.

**Levin** (**B. Yu.**). *Über den Ursprung der Meteoriten.* Chem. Erde, 1958, **19**, 286–295.

A discussion on the origin of meteorites, with special reference to suggestions in the recent Russian literature, but without any definite result. L. J. S.

**Rinehart** (**John S.**). *Meteorites.* Discovery, London, 1957, **18**, 336–340, 5 figs.

A popular account, with some speculations on the origin and formation of meteorites. L. J. S.

**Urey** (**Harold C.**) & **Donn** (**Bertram**). *Chemical heating for meteorites.* Astrophys. Journ., Chicago, 1956, **124**, 307–310.

Changes in temperature, influencing modifications in the structure of meteorites, are ascribed to the presence of " unstable compounds ", rather than to radioactivity. L. J. S.

**Urey** (**Harold C.**). *The early history of the solar system as indicated by the meteorites.* Proc. Chem. Soc. London, 1958, 67–78, 1 fig.

Hugo Müller lecture, 1957. Repetition of previous articles, with further speculations. [See below.] L. J. S.

**Urey** (**Harold C.**). *Diamonds, meteorites and the origin of the solar system.* Astrophys. Journ. Chicago, 1956, **124**, 623–637.

Speculative. Postulating the formation $4{\cdot}5 \times 10^9$ years ago of primary and secondary bodies (of lunar and asteroidal sizes) followed by collisions, the published data relating to meteorites and diamonds are all explained. [M.A. **12**–99, 100, 242, 286, 603 ; **13**–178, 196, 363]. L. J. S.

**Urey** (**Harold C.**), **Mele** (**Aldo**), & **Mayeda** (**Toshiko**). *Diamonds in stone meteorites.* Geochim. Cosmochim. Acta, 1957, **13**, 1–4, 1 pl.

Of 8 stones examined, diamond was found only in the achrondrite, Goalpara. The insoluble residue contained minute black grains (0·3%) which gave the X-ray pattern of diamond. L. J. S.

[**Alekseeva** (**O. M.**)] Алексеева (О. М.). Досвід порівняльних досліджень фізичних властивостей кам'яних метеоритів та деяких гірських порід. Серія Петр., Мін. Геохім., випуск 5, 48 pp., 10 figs. Акад. Наук Україн. РСР, Київ, [Acad. Sci. Ukraine, Kiev], 1958. Price 2r. 25k.

[**Alekseeva** (**K. N.**)] Алексеева (К. Н.). Физические свойс каменных метеоритов и интерпретация их в свете гипо о происхождении метеоритов. Метеоритика, Ак Наук СССР, 1958, **16**, 67–77. Abstract: **Alexey (K. N.).** *Physical properties of stony meteorites their interpretation in the light of the hypothesis of origin of meteorites.* Supplement to Meteoritica, 19 **16**, 16–17.

Determinations were made on several meteoritic sto and terrestrial rocks, and the numerical data obtained tabulated and compared. Results are given for spec gravity, specific heat, conductivity of heat and of electric porosity, magnetism, elasticity, and melting point. T second article, by a co-worker, gives a summary of the paper. L. J. S

[**Yavnel** (**A. A.**)] Явнель (А. А.). Особенности химическ состава метеоритного вещества и происхождение ме ритов.—*The peculiarities of the chemical composition meteoritic matter and origin of meteorites.* Астроно ческий журнал, Акад. Наук СССР [Astronom Journ. Acad. Sci. USSR], 1957, **34**, 445–457, 4 f (English summary, p. 445).

—— Закономерности состава метеоритного вещества условия образования метеоритов. Метеоритика, Ак Наук СССР, 1958, **16**, 11–12. Abstract: *Peculiari of composition of meteoritic matter and conditions formation of meteorites.* Supplement to Meteorit Acad. Sci. USSR, 1958, **16**, 5.

Relations between the amounts of metal and silica and of the amounts of Ni in metal and FeO in silica are plotted on curves for six classes of meteorites (Ca-achondrites, Ca-poor achondrites, chondrites, mesosiderites siderites). These support Prior's law, as opposed to o results [M.A. **10**–393, 394 ; **12**–243 ; **13**–357]. Thi called Prior's " group law ", and with oxidization effective in asteroids. An earlier stage, with differentia of matter (according to the melting points of eleme took place in the parent planet ; this is called Pr ' primary law '. [M.A. **13**–647] L. J.

**Lovering** (**John F.**). *Differentiation in the iron–nickel of a parent meteorite body.* Geochim. Cosmoc Acta, 1957, **12**, 238–252, 3 figs.

The mean nickel content of irons of various t (Ni 5—65%), allowing for their relative abundanc

lated as Ni 11%. It is assumed that this is the position of the original molten metal of the core, and the different types resulted by crystallization differtion. Stony irons have Ni near 11%, suggesting that, is intermediate zone between irons and stones, the l was introduced before crystallization. L. J. S.

**ring (John F.).** *Pressures and temperatures within a typical parent meteorite body.* Geochim. Cosmochim. Acta, 1957, **12**, 253–261.

e pressure-temperature relations in the $\gamma$–$\alpha$ inversion ckel-iron, and in the change from graphite to diamond, est that at the time of crystallization the pressure was $10^5$ atm. and the temperature 2000°K. The core have cooled to 700°K before its disruption.

L. J. S.

**(Harold C.).** *Comments on two papers by John F. Lovering concerning a typical parent meteorite body.* Geochim. Cosmochim. Acta, 1958, **13**, 335–338.

itical discussion. L. J. S.

**in (B. Yu.) & Slonimsky (G. L.)**] Левин (Б. Ю.) и Слонимский (Г. Л.). К вопросу о происхождении метеоритных хондр. [*Question of the origin of meteoritic chondrules*]. Доклады Акад. Наук СССР [C. R. Acad. Sci. URSS], 1957, **113**, 62–64.

—— Ditto. Метеоритика, Акад. Наук СССР, 1958, no. **16**, 30–36, 8 figs. Abstract: *On the origin of meteorite chondrules.* Supplement to Meteoritica, Acad. Sci. USSR, 1958, no **16**, 8.

is postulated that solid particles were condensed from gases of a protoplanetary cloud at low pressure and perature below the melting point of silicates; and that slowly crystallized long before they entered into the position of meteoritic material in the asteroids of a pted planet. [M.A. **13**–646] L. J. S.

**(Sharat Kumar).** *The problems of the origin and structure of chondrules in stony meteorites.* Feldiana, Geology, Chicago Nat. Hist. Mus., 1957, **10**, no. 31, 383–388, 8 plates.

od photomicrographs (16) are given of various types ondrules, but without descriptions. Earlier suggestions the mode of origin are noted; the most likely being chondrules represent molten droplets of 'fiery rain' C. Sorby, 1864, 1877). [M.A. **12**–243.] L. J. S.

**Smith (W. Campbell).** *Meteorites.* Pakistan Journ. Sci., 1958, **10**, 19–25.

A general review with special reference to the origin of chondrules. L. J. S.

**Spencer (L. J.).** *Origin of chondrules in meteoritic stones.* Nature, London, 1958, **181**, 620–621.

The suggestion of H. C. Sorby (1864, 1877) that chondrules represent drops of 'fiery rain' is supported by the findings at the meteorite craters of Wabar in Arabia [M.M. **23**–387], where the iron meteorite and the desert sand were vaporized, and, on condensation, drops fell into pools of boiling silica. Such drops crystallize from their surface, as distinct from internal growth of spherulites and grains in terrestrial rocks. L. J. S.

**Leonard (Frederick C.) & Rowland (Gerald L.).** *An index catalogue of the multiple meteoritic falls of the world.* Meteoritics, Albuquerque, New Mexico, [1957], **1**, no. 4 for (1956), 440–450.

—— —— *The classificational distribution of the single and multiple meteoritic falls of the world.* Ibid., 451–458.

A list of 364 multiple falls (showers), representing 23·2% of observed falls, gives five degrees of concentration (2–10, . . . , 10000–100000), but without clearly stating the actual number of individuals that have been recorded for each fall. [M.A. **13**–46, 355.] L. J. S.

[**Yavnel (A. A.)**] Явнель (А. А.). Классификация метеоритов по вещественному составу. Метеоритика, Акад. Наук СССР, 1958, **15**, 115–135, 1 folded table, 9 figs. Abstract: *The classification of meteorites according to their chemical composition.* Supplement to Meteoritica, Acad. Sci. USSR, 1957, **15**, 7.

A modification of Prior's two-dimensional classification of meteorites [M.M. 1916, **18**–42; 1920, **19**–55; Catalogue of Meteorites (Brit. Mus.) 1923]. The vertical series of six classes (Ca-rich achondrites, Ca-poor achondrites, chondrites, siderolites, lithosiderites, siderites) have Fe ranging from $<1$ to $>75\%$. The horizontal series have Ni ranging from 4 to $>40\%$. In the 30 compartments (some vacant) are given chemical composition, minerals, structure, symbol of type. Block diagrams show the abundance-distribution of the six classes in relation to percentages of Fe, Ni, Si, FeO, MgO, CaO, $Al_2O_3$. Linear and two-dimensional block diagrams illustrate different systems of classification. [M.A. **13**–647.] L. J. S.

[**Yavnel** (**A. A.**) & **Dyakonova** (**M. I.**)] Явнель (А. А.) и Дьяконова (М. И.). Химический состав метеоритов. Метеоритика, Акад. Наук СССР, 1958, **15**, 136–151. Abstract: *The chemical composition of meteorites.* Supplement to Meteoritica, Acad. Sci. USSR, 1957, **15**, 7–8.

The average compositions of siderites in five groups (Ni 5·6–66%) are tabulated: the mean for all (373) analyses is Fe 90·5, Ni 8·7, Co 0·56, Cu 0·02, P 0·20, C 0·03. Similarly, for siderolites, chondrites (130 analyses, $SiO_2$ 41·5–22·6), and achondrites Ca-poor, Ca-rich (42 anal., $SiO_2$ 55–40%). Also tabulated are many determinations (with lit. ref.) of a large number of trace elements. The different groups, it is suggested, represent zones in a parent planet. L. J. S.

[**Yavnel** (**A. A.**) & **Dyakonova** (**M. I.**)] Явнель (А. А.) и Дьяконова (М. И.). Определение различных форм железа в каменных метеоритах. Метеоритика, Акад. Наук СССР, 1958, **15**, 152–155. Abstract: *The determination of different forms of iron in stony meteorites.* Supplement to Meteoritica, Acad. Sci. USSR, 1957, **15**, 8.

The amounts from the total iron to be allotted to metal and silicates can be calculated from the Si : Mg and Fe : Ni ratios shown in the analyses of the magnetically unattracted and attracted portions. A formula is given. The amount present in troilite is given by the sulphur determination. L. J. S.

[**Mikheev** (**V. I.**) (1912–56) & **Kalinin** (**A. I.**)] Михеев (В. И.) и Калинин (А. И.). Применение рентгенометрического метода к исследованию вещественного состава метеоритов. Метеоритика, Акад. Наук СССР, 1958, **15**, 156–179, 3 figs. Abstract: *The application of the röntgenometric method for determining the composition of meteorites.* Supplement to Meteoritica, Acad. Sci. USSR, 1957, **15**, 9–10.

X-ray powder data for the Novo-Urei meteorite gave for olivine $a$ 4·752, $b$ 10·279, $c$ 5·996 kX, the same as for olivine from Kola with 20 mol.% $Fe_2SiO_4$; and for the nickel-iron, $a$ 2·863, corresponding to 4 atom.% Ni. Mordvinovka [= Pavlograd] gave for troilite $a$ 5·5941, $c$ 11·529 kX; for olivine $a$ 4·776, $b$ 10·279, $c$ 6·00 kX, corresponding to $(Mg_{2/3},Fe_{1/3})_2SiO_4$; magnetite in the fusion crust has $a$ 8·370 kX, indicating $(Fe^{II}_{0.75}\ Fe^{III}_{0.17})\ Fe^{III}_2O_4$. Mighei (carbonaceous chondrite) shows amorphous carbon and a chlorite-serpentine mineral. In Nikolskoe [M.A. **13**–359] olivine has $a$ 4·72, $c$ 6·008 kX (Mg : Fe = 2 : 1); iron $a$ 2·863 kX (Ni 4%). Tektite (moldavite) is amorphous. L. J. S.

[**Kvasha**] **Kwascha** (**L. G.**). *Über einige Typen von S meteoriten.* Chem. Erde, 1958, **19**, 249–274, 27

Photomicrographs are given of 13 achrondrites of diff types in the Moscow collection. The chemical compos of 45 achondrites taken from the literature are tabu and plotted on a petrographical diagram. These compared with the average composition of chondrites with terrestrial rocks. L. J.

[**Kvasha** (**L. G.**)] Кваша (Л. Г.). О термальном метаморф некоторых типов каменных метеоритов. Метеори Акад. Наук СССР, 1958, no. **16**, 156–174, 23 figs. stract: *On metamorphism of certain types of meteorites.* Supplement to Meteoritica, 1958, **16**, 2

The "dry" thermal metamorphism, in the absen water and $CO_2$, of meteoritic stones differs in some res from that of terrestrial rocks. Glass may become cry lized, fine grains may be sintered, and larger crystals be recrystallized and granulated. Photomicrograph given of several chondrites and a few achondrites. Ex ments by heating meteoritic stones to 1250—3000°C. sintering and recrystallization; nickel-iron and troilit melted as drops. L. J

[**Yudin** (**I. A.**).] Юдин (И. А.). Непрозрачные мине каменных метеоритов. Метеоритика, Акад. Наук С 1958, **16**, 78–104, 27 figs. Abstract: *Opaque mi in stony meteorites.* Supplement to Meteoritica, Sci. USSR, 1958, **16**, 17–18.

Microscopical examination of several meteoritic s shows the presence of: nickel-iron, nickel-poor troilite, iozite, ilmenite, chromite, oxymagnetite. **13**–90, 360, 647.] L. J

**Lovering** (**John F.**), **Nichiporuk** (**Walter**), **Chodos** (**Ar** & **Brown** (**Harrison**). *The distribution of ga germanium, cobalt, chromium, and copper in iro stony-iron meteorites in relation to nickel conten structure.* Geochim. Cosmochim. Acta, 1957 263–278, 4 figs.

**Nichiporuk** (**Walter**). *Variations in the content of gallium, germanium, cobalt, copper and chromi the kamacite and taenite phases of iron meteorites.* 1958, **13**, 233–247, 1 pl.

In eight siderites Ni 3·3—5·8% concentration of G and Cu is greater in taenite than in kamacite, while Co is present in kamacite. L. J

**ıi (Hiroshi) & Sandell (E. B.).** *Meteoritic and terrestrial abundance of tin.* Geochim. Cosmochim. Acta, 1957, **12**, 262–270, 1 fig.

ondrites contain Sn 1 p.p.m. (in the metallic portion rons contain < 0·5 to 10 p.p.m. (mean 2). Ultrabasic contain 0·5, basic rocks 1·5, and granitic rocks 3 p.p.m. ntration in the lithosphere is assessed at 2±1 p.p.m.

L. J. S.

**(G. W.), Hamaguchi (H.), & Turkevich (Antony).** *The uranium contents of iron meteorites.* Geochim. Cosmochim. Acta, 1958, **13**, 248–255.

the neutron-activation method seven siderites gave $^{-12}$—$10^{-10}$ g/g.

L. J. S.

**aguchi (Hiroshi), Reed (George W.), & Turkevich (Antony).** *Uranium and barium in stone meteorites.* Geochim. Cosmochim. Acta, 1957, **12**, 337–347, 1 fig.

ur chondrites contained U 1–1·40 p.p.m., and an ndrite (Nuevo Laredo) 12·6; they gave Ba 1·05–1·15 12·6 respectively. Basalt and dunite contained ·3 and 0·10 p.p.m. respectively.

L. J. S.

**(G. L.), Potratz (H. A.), & Huizenga (J. R.).** *Thorium in iron meteorites: a preliminary investigation.* Geochim. Cosmochim. Acta, 1958, **14**, 118–125, 1 fig.

terminations by the neutron-activation method on e (two specimens) and Sandia Mountains gave Th $\times 10^{-12}$ g/g.; much lower than previous results on oritic irons. [M.A. **12**–245, **13**–45, 356.] L. J. S.

**ik (I. E.), Petrzhak (K. A.), Shats (M. M.), Semenyushkin (I. N.), & Bak (M. A.)**] Старик (И. Е.), Петржак (К. А.), Шац (М. М.), Семенюшкин (И. Н.) и Бак (М. А.). Распространенность урана в метеоритах и его изотопный состав. Метеоритика, Акад. Наук СССР, 1958, **16**, 126–130. Abstract: *Abundance of uranium in meteorites and its isotope composition.* Supplement to Meteoritica, Acad. Sci. USSR, 1958, **16**, 20–21.

terminations by the activation and luminescent ods gave mean amounts in g/g.: siderites U $0{\cdot}8\times10^{-8}$ $3\times10^{-8}$; chondrites $2{\cdot}0\times2{\cdot}3\times10^{-7}$; pallasite, iron ion $0{\cdot}1\times10^{-7}$, stony fraction $2{\cdot}1\times10^{-7}$. Chondrules ain the same amount as the cementing matrix. The of the isotopes $^{238}$U and $^{235}$U is the same as in terrestrial rials. [M.A. **13**–646, 647.] L. J. S.

**Reynolds (J. H.) & Lipson (J. I.).** *Rare gases from the Nuevo Laredo stone meteorite.* Geochim. Cosmochim. Acta, 1957, **12**, 330–336.

Isotopic composition of helium, neon, argon, and xenon. Part may be due to the action of cosmic rays, and in some cases there may have been a loss of gas. L. J. S.

**[Dyakonova (M. I.)]** Дьяконова (М. И.). Содержание никеля в некоторых образцах железных метеоритов коллекции ан СССР. Метеоритика, Акад. Наук СССР, 1958, **16**, 179–180. Abstract: *Nickel content of certain specimens of iron meteorites in collection of USSR Academy of Sciences.* Supplement to Meteoritica, Acad. Sci. USSR, 1958, **16**, 25.

In order to obtain average samples for analysis of 22 siderites, shavings (0·2—0·3 mm. thick) were taken from the entire cut surfaces, and any troilite, schreibersite were removed. The results range from Ni 5·46% (Boguslavka), 5·80 (Gressk), for hexahedrites; 12·22 (Edmonton), 15·31 (Butler), finest octahedrites; to 16·56 (Chinge), nickel-rich ataxite. Others are octahedrites, Ni 6·23–9·45%.

L. J. S.

**[Krinov] Krinow (E. L.).** *Über den Mechanismus der Zerstörung von Meteorkärpern in der Atmosphäre und über ihre primären Formen.* Chem. Erde, 1958, **19**, 230–248, 23 figs.

Illustrations are given of the various types of external form and of surface marks on Russian meteorites. On siderites stream-line flows of molten metal are shown, and these may be swept off by ablation during the flight of the meteorite through the atmosphere. Near the place of fall of the meteorite tiny globules of metal or magnetite have been collected with a magnet from the soil; but there is a possibility that these may be confused with similar globules found in industrial districts. [M.A. **11**–269, **12**–252, 605, **13**–47, 48.] L. J. S.

**[Rimskaya-Korsakova (O. M.)]** Римская-Корсакова (О. М.). Метеориты коллекции геологического факультета Ленинградского государственного ордена Ленина университета им. А. А. Жданова. Метеоритика, Акад. Наук СССР, 1958, **15**, 190–194. Abstract: *The collection of meteorites of the geological faculty of the Leningrad university.* Supplement to Meteoritica, Acad. Sci. USSR, 1957, **15**, 10.

Mostly quite small fragments representing 26 falls in USSR, 28 from other countries, and a few unidentified specimens. L. J. S.

**Wickman** (**Frans E.**). *Meteoriterna kring Kitkiöjarvi och Kitkiöjoki.* Riksmuseum, Stockholm, Leaflet, 1956, 4pp.

Historical note on the finding around Kitkiöjarvi and Kitkiöjoki in Swedish Lapland of two masses (7½ kg. found 1906, 15 kg. found 1946) of the Muonionalusta siderite. A third mass said to have been found in the 1870's has not been preserved. [M.A. **10**–515, **12**–356.] L. J. S.

**Levi** (**Gemmarosa Donati**). *Sulla meteorite caduta in Alfianello* (*Brescia*) *il* 16 *Febbraio* 1883. Atti e Mem. Accad. Sci. Lett. Arti, Modena, ser. 5, **13**, 160–174, 2 plates.

The fragments still preserved in 54 museums are listed; total weight 71½ kg. Microscopical examination shows olivine, orthorhombic pyroxene, merrillite, glass, kamacite, taenite, plessite, micro-plessite, troilite, and various types of chondrules. It is classed as an intermediate v bronzite-chondrite. L. J.

**Rossetti** (**V.**) & **Sitzia** (**R.**). *Meteorite di Sinnai* (*Cagl* Periodico Min., Roma, 1957, **27**, 179–199, 1 fig

Early in the morning of 19 February, 1956, a ston through the roof and the floor of a shed at Sinnai (7 N.E. of Cagliari) in Sardinia, breaking into six pieces a total weight of about 1½ kg. It is a chondrite a compared with Cronstad. Olivine has $\alpha$ 1·685, $\beta$ $\gamma$ 1·718, 2V 87°. Orthorhombic pyroxene has $\alpha$ $\beta$ 1·678, $\gamma$ 1·685, 2V 80°. Monoclinic pyroxene (cli statite) has $\gamma : c$ 18–22°. Analyses of the portions attr and unattracted by a magnet gave the bulk composi $SiO_2$ 32·26, $TiO_2$ 0·45, $Al_2O_3$ 2·46, $Fe_2O_3$ 0·39, $Cr_2O_3$ $Cr_2S_3$ 0·03, FeO 9·86, MnO 0·22, NiO 0·12, MgO CaO 2·66, $Na_2O$ 0·56, $K_2O$ 0·19, $H_2O$ 0·34, $P_2O_5$ $As_2O_5$ trace, Fe 18·96, Ni 1·47, Co 0·17, Fe 2·88, S CaS 0·56, [=98·05]. The presence of oldhamite and dau lite is suggested. Exposure to photographic plates U $1{\cdot}35\times10^{-7}$, Th $3{\cdot}5\times10^{-7}$. L. J.

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## MINERAL DATA

**Yoshimura** (**Toyofumi**) & **Shirozo** (**Haruo**). *Bariumadularia from the Isagosawa mine, Iwate prefecture, Japan.* Proc. 7th Pacific Science Congress (Auckland and Christchurch meeting), 1953 (for 1949), **2**, 206.

Barium-adularia, coloured white with various shades of red and brown, occurring in veinlets cutting hematite ore in the Isagosawa mine, has $\alpha$ 1·520–1·522, $\gamma$ 1·526–1·528, 2V (–) 75°; $SiO_2$ 61·15, $Al_2O_3$ 30·58, $Fe_2O_3$ 0·29, CaO 0·16, BaO 3·36, $K_2O$ 13·87, $Na_2O$ 0·41, ign. loss 0·30, = "100·12" [the figure for $Al_2O_3$ is obviously in error, probably a misprint for 20·58]; sp. gr. 2·585 at 11°C. W. A. W.

**Kilpady** (**Sripadrao**) & **Dave** (**A. S.**). *On a green micaceous mineral from Koradih, Nagpur district.* Journ. Univ. Geol. Soc. Nagpur, 1955, **1**, 2 (for 1954–55), 13–15. 1 plate, 1 fig.

A dark emerald green mineral, previously referred to mica, occurs as books 4 inches across and 3 inches thick, with garnet, epidote, etc., in dolomitic marble. Cleavage flakes are flexible but not elastic; sp. gr. 2·69–2·70, H. < 2, $n$ 1·576–1·587, $2V_\gamma$ 30½°, $\gamma$ slightly inclined to $c$-axis. Analysis gave $SiO_2$ 28·48, $Al_2O_3$ 21·74, $Fe_2O_3$ 2·60, MnO 0·44, MgO 32·42, CaO 1·17, alkalis 0·70, $H_2O$ = 100·87. It is a chlorite referred to corundophili L. J.

**Rath** (**R.**) & **Puchelt** (**H.**). *Indigolith von Usakos.* Jahrb. Min., Monatshefte, 1957, 206–209.

The clear-blue indicolite variety of tourmaline occur petalite and lepidolite east-south-east of Usakos, S West Africa. It has $\omega$ $1{\cdot}6394_0$, $\epsilon$ $1{\cdot}6207_8$ for Na ligh refractive indices are tabulated for various wavele with dispersion F–C 0·0095. The mean of three che analyses gave $SiO_2$ 37·88, $B_2O_3$ 10·80, $Al_2O_3$ 38·75, 0·50, FeO 3·18, MnO 0·63, MgO 0·69, CaO 0·70, $Li_2O$ $K_2O$ 0·13, $Na_2O$ 2·07, $H_2O$ 2·64, $TiO_2$ 0·02, F 1·16 O≡F 0·49)=100·10 : sp. gr. 3·105. R. A.

**Frenzel** (**Gerhard**). *Zur Kenntnis von Bismutota* Neues Jahrb. Min., Monatshefte, 1955, 241–251,

Pebbles of bismutotantalite from Recife, Brazil, analysis by R. Herzenberg, $Bi_2O_3$ 49·9, $Ta_2O_5$ 46·0, 2·2, $SiO_2$ 1·4, $Fe_2O_3$ 0·17, =99·67; sp. gr. 8·85, corresp to $Bi(Ta,Nb)O_4$. X-rays gave $a$ $4{\cdot}9_7$, $b$ $5{\cdot}5_7$, $c$ ($a : b : c$=0·8923 : 1 : 2·115), with 4 mol., calc. sp. gr.

ler data are compared with stibiotantalite [M.A. **7**–121, 3] and $BiTaO_4$, $BiNbO_4$[M.A. **11**–427]. Similar material n Acary near Picui, Paraiba, Brazil, is also described. I. **22**–185.] L. J. S.

**w** (**Denis M.**). *Xenotime from St. Siméon, Charlevoix County, Quebec.* Canadian Min., 1957, **6**, 61–67.

enotime occurs as a minor, fine-grained accessory in ssic rocks at two localities near St. Siméon, Charlevoix nty, Quebec, and has $\omega$ 1·724 (faint yellow), $\epsilon$ 1·810 ourless); sp. gr. 4·69 ; $a$ 6·89, $c$ 6·03, $c/a$ 0·875. Spectro-hic analysis gave $Y_2O_3$ 49·9, $ThO_2$ 1·73, $UO_2$ 2·75, $SiO_2$, Gd, and Dy in the range 1—5%. The details the spectrographic method used are outlined, and ay powder spacings and intensities are listed [M.A. 31, **10**–348]. R. A. H.

**er** (**Eyvind**) & **Sellevoll** (**Markvard A.**). *The crystal system and space group of meta-uranocircite.* Norsk Geol. Tidsskr., 1957, **37**, 438–439.

n a specimen from Wölsendorf in Bavaria it was found t meta-uranocircite is orthorhombic and probably ngs to the space group *Cmmm*. The unit cell dimensions given as $a$ 13·9, $b$ 13·9, $c$ 16·9Å (±0·5%) ; $\gamma-\alpha$ 0·004. I. W. O.

**mpson** (**R. M.**). *Danalite from British Columbia.* Canadian Min., 1957, **6**. 68–71.

Danalite, $(Fe,Mn,Zn)_4Be_3Si_3O_{12}S$, occurs as translucent namon to reddish-brown anhedral grains in a magnetite, rite, fluorite, sericite, quartz skarn between impure nbrian limestone and a Mesozoic granitic intrusion at dlepoint Mountain, McDame area, British Columbia. e danalite has sp. gr. 3·31, $n$ 1·753, $a$ 8·196Å : a partial lysis by S. Metcalfe gave Fe 25·1, Mn 10·5, Zn 2·9. e indexed X-ray powder pattern is tabulated [M.A. 1, 311]. R. A. H.

**illemin** (**C.**) & **Pierrot** (**R.**). *Nouvelles données sur la schuilingite.* Bull. Soc. franç. Minér. Crist., 1957, **80**, 549–551.

The validity of schuilingite [M.A. **10**–147] as a species is nfirmed. The symmetry is probably monoclinic, the rstals being flattened on {100} and showing a pinacoidal m {*h*0*l*}, colour turquoise blue to azure blue, good avage along the length of the crystals, H. 3–4, sp. gr. , $2V_\alpha$ 66°, $\alpha$ (calc.) 1·710, $\beta$ 1·755, $\gamma$ 1·775, non-pleochroic; st crystals show straight extinction but some have an lique extinction of 8° to 10°. Schuilingite dissolves readily with effervescence in dilute acid ; it gives reactions for Pb, Cu, and Ca. An analysis on 40 mg. gave PbO 37·4, CuO 9·4, CaO 19·8, $H_2O$ 9·9, $CO_2$ 20·9, insol. 3·1, =100·5 : on recalculation free from impurity this indicated a formula $Pb_3Cu_2Ca_6(CO_3)_8(OH)_6.6H_2O$. The X-ray powder pattern is tabulated. The specimens were from Kalompe, Katanga, and were associated with quartz, sericite, clay minerals, cerussite, pyrite, limonite, and an amorphous black manganese material. R. A. H.

**Bertaut** (**Felix**) & **Forrat** (**Francis**). *Étude des paramètres des grenats.* C. R. Acad. Sci. Paris, 1957, **244**, 96–99.

The variation in the cell size of the ferrimagnetic garnets $A_3Fe_5O_{12}$, where $A$ = rare earths and Y, clearly demonstrates the lanthanide contraction. The edge of the unit cell of these garnets and of the silicate garnets can be derived from an equation including the ionic radii of the constituents. For the naturally occurring garnets $A_3B_2Si_3O_{12}$ the equation is $a = 9{\cdot}223 + 1{\cdot}407r(A) + 1{\cdot}694r(B)$ where $r(A)$ and $r(B)$ are the ionic radii for the ions in the $A$ and $B$ positions. R. A. H.

**Kern** (**R.**), **Rimsky** (**A.**) & **Monier** (**Jean-Claude**). *Contribution à l'étude de la niocalite.* C. R. Acad. Sci. Paris, 1957, **245**, 2063–2064.

Niocalite from the type area in Quebec [M.A. **13**–211] has been studied by X-rays and is shown to be orthorhombic, space group $B222$, with $a$ 7·339, [$b$] 10·432, $c$ 20·285 kX, $Z = 6$. R. A. H.

**Mason** (**Brian**). *Notes on some New Zealand minerals.* New Zealand Journ. Sci. Techn., 1955, **36** (sect. B). 557–560.

Occurrences of stibiconite, bournonite, tridymite, natrolite, thomsonite, chabazite, cummingtonite, and piemontite are briefly described. The tridymite, from a tridymite-trachyte dyke at Lyttelton, has a mean refractive index of 1·478, birefringence about 0·003. Analysis gives : $Al_2O_3$ 2·70, $Fe_2O_3$ 0·25, MgO 0·03, CaO 0·2, $TiO_2$ 0·28, $Na_2O$ 0·67, $K_2O$ 0·75, MnO 0·005, $SiO_2$ (by difference) 95·1, =99·98. [A.M. **38**–866–7 ; M.A. **12**–258 : in this paper MgO is shown as 0·4 instead of 0·03]. The natrolite, from Red Island, Hawkes Bay, North Island, gives $\alpha$ 1.480, $\gamma$ 1·490, sp. gr. 2·20, and has the composition $SiO_2$ 46·6, $Al_2O_3$ 27·2, CaO 1·3, $Na_2O$ 14·7, $K_2O < 0{\cdot}01$, $H_2O$ 9·6, =99·4. A small amount of thomsonite, with $\alpha$ 1·520, $\beta$ 1·524, $\gamma$ 1·534, and $2V_\gamma$ 58°, is associated with the natrolite. Chabazite, from Cass Peak, Port Hills, Canterbury, has a mean refractive

index of 1·485, very low birefringence, and sp.gr. 2·08; $SiO_2$ 44·4, $Al_2O_3$ 21·5, CaO 10·4, $Na_2O$ 0·85, $K_2O$ 0·46, $H_2O$ 21·6, = 99·21. W. A. W.

**Battey** (**M. H.**). *The occurrence of babingtonite in spilite from Three Kings Islands* [*New Zealand*]. Rec. Auckland Inst. Mus., 1954, **4**, 263–266, 1 fig.

The following optical properties are recorded: $\alpha = 1{\cdot}713$, $\beta$ 1·724 (both $\pm 0{\cdot}003$), $\gamma$ 1·744 ($\pm 0{\cdot}005$); $2V_\gamma$ 80°, 85°, 86°; dispersion $r > v$ distinct; pleochroism $\alpha$ bright green, $\beta$ pale purple-brown, $\gamma$ strong purple-brown. Comparison is made with other parageneses of babingtonite.

W. A. W.

**Thoreau** (**J.**) & **Safiannikoff** (**A.**). *Triphylite, lithiophilite et phosphates associés de Congo Belge et du Ruanda*. Acad. Roy. Belgique, Bull. Cl. Sci., 1957, ser. 5, **43**, 324–327.

Optical and chemical study of minerals found in the Belgian Congo for the first time. The mineral from Buranga contains dark brown veins of a mineral which appears to be similar to sicklerite (C), and also encloses spots of blue strengite.

| | $P_2O_5$ | FeO | MnO | CaO | $Li_2O$ | $Na_2O$ | $K_2O$ | $H_2O$ | Insol. | Tota |
|---|---|---|---|---|---|---|---|---|---|---|
| A | 44·45 | 18·15 | 28·33 | 0·30 | 8·6 | 0·2 | tr. | n.d. | 0·30 | 100·33 |
| B | 44·32 | 31·74 | 14·54 | 0·40 | 8·9 | 0·25 | tr. | n.d. | 0·75 | 100·90 |
| C | 26·70 | −(1) | 29·21 | −(2) | 0·25 | — | — | 16·86 | — | — |

A. Lithiophilite from Buranga (Ruanda): $\alpha = 1{\cdot}678$, $\gamma = 1{\cdot}688$, $2V(+) = 55°$, $r > v$ strong. B. Triphylite from Kobokobo (Maniema): $\alpha$ 1·689, $\gamma$ 1·696 $2V(+)$ small (15° to 20°), $r > v$ strong. C. Partial analysis of dark brown veins in A: (1) $Fe_2O_3 = 21{\cdot}31$, (2) $Mn_2O_3$ possibly present. J. M.

**Thoreau** (**J.**). *L'Hureaulite de Kobokobo (Maniema, Congo Belge)*. Acad. Roy. Belgique, Bull. Cl. Sci., 1957, sér. 5, **43**, 364–368.

Hureaulite, a mineral new to the Belgian Congo, is associated with dark green dufrenite. It is more or less transparent and occurs in lumps or in little isolated crystals; the tint varies from rose to very pale brown or colourless. Pleochroism is slight; resinous lustre on fracture. The crystals are monoclinic, flattened on (100), with forms {100}, {110}, {111}, and sometimes $\{\bar{1}01\}$ and $\{\bar{5}12\}$. From measurement of faces, $a : b : c = 1{\cdot}918 : 1 : 1{\cdot}046$, $\beta = 96°\ 49'$. $\alpha$ 1·652, $\gamma$ 1·664 (Na light), 2V (—) very large, $r > v$. Analysis of an almost pure aggregate: FeO 9·63, MnO 34·68, $P_2O_5$ 43·98, $H_2O$ 11·14, insol. 1·62, = 101·05. J. M.

**Kourimsky** (**J.**) & **Satava** (**J.**). *A contribution on question of the determination of minerals of the serpen group*. Sborník Národního Musea v Praze (Prag 1954, **10** B, no. 4.

D.t.a. curves are presented for eighteen serpen specimens from various localities. The curve from chr tile has a dehydrating minimum at 680–700°C while t from antigorite is at 780–800°C, and exothermic pe are at (800–810°C) and (820–840°C) for chrysotile antigorite respectively. On the basis of these curves specimens were judged to be either chrysotile or antigo or mixtures of these two. Refractive indices have b measured and previously published, chemical analyses tabulated [M.A. **6**–475, **13**–462]. J. Z

[**Pavlov** (**N. V.**)] Павлов (Н. В.). О маггемите в магнетито рудах Кежемского месторождения. [*On maghemite f a magnetite ore in Kezhem deposit*]. Труды Мин Муз. Акад. Наук СССР, [Trans. Min. Mus. A Sci. USSR], 1957, **8**, 77–84, 2 figs.

Maghemite, in the form of incrustations and pisol occurs in magnetite veins of the Kezhem deposit in Ang Ilim region in central Siberia. It is dark brown in col $a$ 8·31Å; sp. gr. 4·51, H. 5, strongly magnetic. Anal gave $SiO_2$ 1·03, $Al_2O_3$ 3·30, $Fe_2O_3$ 86·37, FeO 4·21, M 2·15, = 97·06. This corresponds to maghemite 73, spinel and magnetite 17 mol. per cent. S. I. T

[**Sosedko** (**A. F.**)] Соседко (А. Ф.). Стибиотанталит пегматитовой жилы на севере Кольского полуостр [*Stibiotantalite from a pegmatite vein in the nort Kola peninsula*]. Доклады Акад. Наук СССР [C Acad. Sci. URSS], 1958, **118**, 1025–1026.

Stibiotantalite, in association with cleavelandite, lith mica, spodumene, quartz and other minerals, is found pegmatite vein. It occurs as fine prismatic crys terminated by pyramids and also as granular cryst steel-gray on fresh fractured surface, dark grey to blac a weathered surface. Cleavage perfect on (010), good (100) and (001). H. 5·5, sp.gr. 6·212, biaxial, 2V la refr. ind. very high, birefringence 0·08–0·10. The analy material is shown to consist of a mixture of stibiotanta microlite, simpsonite, and albite. S. I. T

[**Komkov** (**A. I.**] Комков (А. И.). О фергусоните. *fergusonite*]. Зап. Всесоюз. Мин. Общ. [Mem. Union Min. Soc.], 1957, **86**, 432–444, 6 figs.

1956, E. I. Nefedov discovered an anisotropic crystal-
ergusonite in an aplitic portion of a pegmatite vein in
niddle Urals. On analysis it gave CaO 1·40, MnO
, FeO 0·36, $Y_2O_3+Er_2O_3$ 42·60, $ZrO_2$ 0·93, $SiO_2$ 0·14,
0·50, $Nb_2O_5$ 51·65, $Ta_2O_5$ 2·50, $H_2O$ 0·22,=100·30.
analysed material contains about 2% columbite and
ircon. X-ray and thermal studies show that there are
al modifications of $YNbO_4$: (1) natural (fergusonite),
uctural with scheelite, with a regular disposition of
d Nb ions, tetragonal unit cell, *a* 5·15, *c* 10·89 kX,
34°, weak dispersion, $r>v$, $\alpha \geqslant 2{\cdot}18$, $\beta \leqslant \gamma$ 2·28;
monoclinic modification, obtained by heating the
gonal modification to 900°C. and subsequently cooling,
5, *b* 10·89, *c* 5·27 kX, β 85° 30′, non-regular structure,
11°, α 2·14, γ 2·28, marked dispersion, $r>v$, $\alpha$=[010].
.. **14**–38.] S. I. T.

**netova** (**V. A.**)] Корнетова (В. А.). Новая находка минерала из группы чильдренита-эосфорита в пегматитах Восточного Забайкалья. [*A new find of a mineral belonging to the group of childrenite–eosphorite from pegmatites of eastern Transbaikal region*]. Труды Минер. Муз. Акад. Наук СССР [Trans. Miner. Mus. Acad. Sci. USSR], 1957, **8**, 154–159, 2 figs.

his mineral is found in cavities of albitized pegmatite ssociation with quartz and albite. It occurs as small natic crystals of light yellow to orange colour, mono-, twinned on the axis *c*, poor (100) cleavage, sp. gr. -3·08, α 1·642, β 1·662, γ 1·670, 2V≈40–45°. Analysis CaO 0·80, MgO 0·54, FeO 15·70, MnO 14·76, $Al_2O_3$ 3, $Fe_2O_3$ 1·79, $P_2O_5$ 31·22, $H_2O+$15·28, ins. res. ($SiO_2$) =99·56. Formula: $(Fe^{II},Mg,Mn,Ca)_{1·00}(Al,Fe^{III})_{0·82}(OH)_{1·46}1{\cdot}18H_2O$. S. I. T.

**ostova** (**V. A.**)] Хвостова (В. А.). Новая находка гольмквистита. [*A new discovery of holmquistite.*] Доклады Акад. Наук СССР [C.R. Acad. Sci. URSS], 1958, **118**, 1027–1030, 3 figs.

olmquistite is found in a biotite-rich quartz-amphibole st in Eastern Sayan region. It occurs as elongated natic crystals, violet to black-violet in colour, H. 5–6, gr. 3·12, biaxial, negative 2V 50–52°, α 1·642, γ 1·666, chroism α light-yellowish-green, β bluish-violet. X-ray chemical data are given. S. I. T.

**ova** (**E. M.**)] Еськова (Е. М.). Гентгельвин из щелочных пегматитов. [*Genthelvite from alkaline pegmatites.*] Доклады Акад. Наук СССР [C.R. Acad. Sci. URSS], 1957, **116**, 481–483, 1 fig.

Genthelvite occurs in the form of irregular segregations in pegmatite in the Lovozero Tundra, Kola peninsula. Colourless to bluish-green and emerald-green, sp. gr. 3·55, isotropic, *n* 1·742. On analysis gave $SiO_2$ 27·35, BeO 12·00, ZnO 40·00, MnO 10·21, $Fe_2O_3$ 6·70 (as FeO 6·03), FeO-n.d., S 5·74,=102·00 <O for S 2·87,=99·13. It is a manganese-rich variety of genthelvite. S. I. T.

[**Shishkin** (**N. N.**)] Шишкин (Н. Н.). О никелистой разновидности кобальтина. [*On a nickel variety of cobaltite.*] Доклады Акад. Наук СССР [C.R. Acad. Sci. URSS] 1957, **114**, 414–415.

A nickel-variety of cobaltite is found in the skarn contact of a diorite in the Vladimirovsky deposit in the Altai. The mineral is of a bright pink colour which assumes a violet shade in reflected light. Other properties are those of cobaltite. Analysis gave Co 24·00, Ni 7·73, Fe 4·87, As 46·54, S 17·50, Cu trace,=100·64, corresponding to the formula (Co,Ni,Fe)AsS. X-ray data gave *a* 5·60Å. S. I. T.

[**Kopchenova** (**E. V.**) & **Skvortzova** (**K. V.**)] Копченова (Е. В.) и Скворцова (К. В.). Натриевый ураноспинит. [*Soda uranospinite.*] Доклады Акад. Наук СССР [C.R. Acad. Sci. URSS], 1957, **114**, 634–636, 1 plate, 1 fig.

Sodium uranospinite is a common mineral in the oxidation zone of the nasturan-sulphide ores occurring in carbonatized felsite porphyries and tuff breccias of Devonian age [locality ?]. It occurs in the form of elongated tabular crystals forming thin incrustations along joint planes of the rocks. It is yellow-greenish to straw-yellowish in colour, sp. gr. 3·846, H. 2½, tetragonal, cleavage (001) perfect, (010) and (100) distinct, vitreous lustre, biaxial, negative, 2V small, α 1·585, γ 1·612, slightly pleochroic, *a* 7·12, *c* 8·61 Å. Microchemical analysis gave $UO_3$ 58·29, $P_2O_5$ 1·65, $As_2O_5$ 20·84, $SiO_2$ 2·39, $Al_2O_3$ 0·91, $Fe_2O_3$ 0·57, CaO 1·87, MgO trace, $Na_2O$ 3·91, $K_2O$ abs., $H_2O+$3·49, $H_2O-$ 6·00,=99·92, corresponding to the formula (Na,Ca)O. $(UO_2)_2[As,P)O_4]_2.5{\cdot}2\ H_2O$. S. I. T.

[**Kalita** (**A. P.**)] Калита (А. П.). О составе обручевита — гидратированной урано-иттриевой разновидности пирохлора. [*On the composition of obruchevite—a hydrated uranium-yttrium variety of pyrochlore.*] Доклады Акад. Наук СССР [C.R. Acad. Sci. URSS,] 1957, **117**, 117–120, 1 fig.

In 1945 E. I. Nefedov discovered in a pegmatite vein in the Alakurtti region (N.W. Karelia) a peculiar metamict

tantalo-niobate, which he classed with ellsworthite. In 1949 A. A. Beus after a study of this mineral called it obruchevite in honour of V. A. Obruchev. This study is extended by the present writer, who gives also a detailed account of the pegmatite vein which contains this mineral. Obruchevite replaces albite and infills cracks in quartz. It occurs in association with garnet and other minerals as nests and irregular masses up to 5 cm. in diameter. Under the microscope it is isotropic, $n$ 1·830 to 1·835, sp. gr. 3·60–3·80, H. 4·5–5. Two chemical analyses gave: $SiO_2$ 3·78, 3·20; $TiO_2$ 6·29, 2·74; $Al_2O_3$ —, 1·40; $Fe_2O_3$ 4·30, 3·52; $Y_2O_3$ 11·34, 11·73; $Ce_2O_3$ 0·66, 1·13; $Nb_2O_5$ 37·54, 37·30; $Ta_2O_5$ 5·47, 7·23; MnO 0·35, 0·00; MgO 0·26, 0·18; CaO 2·82, 2·66; $Na_2O$ 2·43, 2·03; $K_2O$ 0·31, 0·70; $ThO_2$ 0·26, 0·11; $UO_3$ 9·72, 10·50; 1st analysis: $H_2O+$ 7·77, $H_2O-$ 6·48, =99·78. 2nd analysis: $H_2O\pm$ 14·50, ign. loss 1·00, ='100·33'. X-ray analysis of a specimen ignited at 1100°C shows that obruchevite belongs to the pyrochlore group. The dimensions of the body-centred cubic unit cell vary from 10·00 to 10·34Å. The formula is of an $A_2B_2O_6(OH)$ type. It is concluded that obruchevite is a strongly hydrated variety of uranium-yttrium pyrochlore. [M.A. **31**–969; A.M. **43**–797; M.A. **14**–58] S. I. T.

**Midgley** (**H. G.**). *A further occurrence of phosgenite.* Min. Mag., 1958, **31**, 883.

Phosgenite from an ancient lead pot in Wookey Hole [Somerset] occurs as clear colourless flattened plates: {001} is prominent and other forms include {120}, {111}, {110}, {010}, and {021}. Analysis by R. S. Gillett gave PbO 81·2, Cl 12·6, $CO_2$ 8·0 [=101·8]: refr. ind. ≈ 2·15, uniaxial (+), sp. gr. 6·15. X-ray powder diffraction data are tabulated: using the unit cell proposed by Oftedal [M.A. **9**–229] the cell dimensions thus obtained are $a$ 8·112Å, $c$ 8·814, $c/a$= 1·086 [M.M. **31**–500]. R. A. H.

**Bothwell** (**D. I.**) & **Hey** (**M. H.**). *The nature of chlorospinel.* Min. Mag., 1958, **31**, 885–887.

Re-investigation of chlorospinel from the Shishimsk Mountains, south Urals, has shown that it is a valid variety as described by Rose (1840) and not a gahnospinel as recently suggested [M.A. **13**–189]. Chemical analysis by D. I. Bothwell gave MgO 26·5, FeO 1·8, ZnO 0·8, MnO 0·3, $Al_2O_3$ 60·7, $Fe_2O_3$ 7·2, $TiO_2$ 1·2, insol. 1·2, = 99·7; sp. gr. 3·63; $n$ 1·729, $a$ 8·105Å [M.A. **8**–174]. R. A. H.

**Deans** (**T.**). *Isokite from Mangualde, Portugal.* Min. Mag., 1958, **31**, 819–820.

Re-examination of an unnamed mineral [M.A. **6**–440] from Mangualde, in the province of Beira, Portugal, shown it to be isokite. A specimen of dull white ea material, occurring in irregular cavities in black tri had minutely crystalline aggregates of fibres with α 1 γ 1·610, elongation –ve. The phosphate content of a sample was re-determined, giving $P_2O_5$ 37·0%, allo the original analysis to be restated: this then indica composition close to $CaMgPO_4F$. The phosphate sequ at Mangualde thus comprised a main hydrothermal p of lithiophilite and triplite, with rare manganapatite, a later mixed hydrothermal and supergene phas heterosite, hureaulite, strengite, isokite, and torbe [M.M. **30**–68, **31**–587] R. A.

**Moss** (**A. A.**). *Alumian and natroalunite.* Min. 1958, **31**, 884–885.

Examination of the type alumian (Breithaupt, 185 decomposition product formed on pyrite and galena-be veins in an argillaceous schist at Sierra Almagrera, sou Spain, showed it to have sp. gr. 2·780, $a$ 6·983Å, $c$ 1 ω 1·574, ε ≈ 1·590, and to occur as minute rhombs size ≈ 10 μ). Chemical analysis gave $Na_2O$ 7·6, $K_2O$ BaO 0·1, SrO 0·9, PbO 0·6, $Al_2O_3$ 36·8, $Fe_2O_3$ 0·4 38·3, $H_2O+$ 14·9, $H_2O-$ nil, = 99·7, indicating the cell content to be $NaAl_3(SO_4)_2(OH)_6$, and that alu is the sodium end-member of the alunite series, a m hitherto unrecorded. [A.M. **43**–1225] R. A.

**Bloxam** (**T. W.**). *Pumpellyite from south Ayrshire.* Mag., 1958, **31**, 811–813, 1 fig.

Pumpellyite occurs mainly in quartz-veins, with and calcite, in altered Ordovician spilitic lavas o Girvan-Ballantrae complex at Knockormal Farm, 1 east of Lendalfoot, Ayrshire. Along the walls o quartz-veins it forms acicular clusters with a stellate the crystals being elongated parallel to $b$ and the tr a strong {001} cleavage. Analysis gave $SiO_2$ 37·20, 0·18, $Al_2O_3$ 24·84, $Fe_2O_3$ 2·02, FeO 3·11, MnO 0·12, 2·70, CaO 22·91, $Na_2O$ 0·22, $K_2O$ 0·00, $H_2O+$ 6·60, = 9 sp. gr. 3·23; α 1·691, colourless, β 1·693, blue-green, γ colourless; $2V_\gamma$ 12–25°, strong dispersion, $\alpha\gamma$ $a$ $\beta=b$. The pumpellyite is considered to have been f at low temperatures in association with processes br about albitization of the plagioclase. [M.M. **24**–529, 3 M.A. **3**–8, **5**–233, **7**–30, **11**–200] R. A

**Smith** (**J. V.**) & **Tuttle** (**O. F.**). *The nepheline–k system: 1: X-ray data for the crystalline p* Amer. Journ. Sci., **255**, 282–305, 3 figs.

-ray data are given for the phases high-carnegieite, low-egieite, high-nepheline, and low-nepheline of composi- $NaAlSiO_4$; for synthetic kaliophilite, anomalous ral kaliophilite, natural kaliophilite, orthorhombic $SiO_4$ and kalsilite of composition $KAlSiO_4$; and for other phases in this system, tetrakalsilite of composition $Ne_{30}Kp_{70}$ and a phase designated O2, of composition $Ne_{20}Kp_{80}$. A plot of lattice parameters against per cent. or the phases in the system shows a break near $Na_{75}K_{25}$ possible explanations for this are given, one being that e is a compound of composition $Na_3KAl_4Si_4O_{16}$. The cations are that with the exception of carnegieite all phases discussed are structures based on the tridymite- framework. W. S. M.

**r (Norman).** *The $Ag_2S$–$Cu_2S$ system.* Econ. Geol., 1955, **50**, 347–350, 1 fig.

tromeyerite from Gowganda, Canada, was examined by le crystal Weissenberg and precession techniques and e $a$ 4·06, $b$ 6·66, $c$ 7·99Å, $Z=4$, space group $Cmc2_1$ or $cm$: indexed X-ray powder data are listed [M.A. **12**–515]. he $Ag_2S$–$Cu_2S$ system there is no appreciable substitution $u_2S$ in $Ag_2S$, or of $Ag_2S$ in $Cu_2S$ [M.A. **6**–346]: a distinct se at $Ag_{75}Cu_{25}S_{50}$ corresponds to the mineral jalpaite $CuS_2$ [M.A. **12**–289]. R. A. H.

**llcross (F. V.) & Carpenter (G. B.).** *X-ray diffraction study of the cubic phase of ice.* Journ. Chem. Physics, 1957, **26**, 782–784.

ubic ice could be obtained only by direct crystallization n the vapour on to surfaces at low temperature. The gen atoms have a diamond-type structure: $a$ 6·37±0·02Å −190°C. R. A. H.

**coyama (Kanae).** *Two skarn epidotes from the vicinity of Mt. Uzumine, Fukushima Prefecture.* Sci. Rep. Tohoku Univ., Third Ser. (Min., Petr., Econ. Geol.), 1957, **5**, 373–388, 11 figs.

Well-formed dark green crystals of epidote associated h garnet and apatite occur in skarn near pegmatite in tite schist with limestone, at Izumo mine, Mt. Uzumine trict. Goniometric measurements gave $a:b:c=$ 811 : 1 : 1·8017, β 115° 38′ : sp. gr. $3·43_1$, α 1·727, β 1·755, 1·786, $2V_\alpha$ large, $\gamma:c=21°$. Chemical analysis by Kono gave $SiO_2$ 36·92, $TiO_2$ tr., $Al_2O_3$ 22·25, $Fe_2O_3$ 15·21, O 0·57, MgO tr., MnO 0·75, CaO 23·11, $H_2O+$ 1·16, O− 0·16, =100·13. Greenish black epidote also occurs h garnet in skarn at Nakatsugawa mineral springs, north-east of Mt. Uzumine. Goniometric measurements gave an average value $a:b:c=1·5830:1:1·8067$, β 115° 25′: other properties include sp.gr. 3·434, α 1·7364, β 1·7578, γ 1·7694. R. A. H.

**Henriques (Å.).** *An iron-rich scorzalite from Hållsjöberget (Horrsjöberget), Sweden.* Arkiv Min. Geol., 1957, **2**, 127–131.

An iron-rich scorzalite [M.A. **10**–507] occurs with lazulite in the kyanite-quartzite at Hållsjöberget, Värmland, Sweden: it is associated chiefly with quartz, rutile, and kyanite. Chemical analyses by A. Aaremäe gave for the scorzalite (impurities; 1·17% apatite, 0·06% quartz, 0·41% rutile) $SiO_2$ 0·06, $TiO_2$ 0·41, $Al_2O_3$ 28·27, $Fe_2O_3$ 2·98, FeO 17·70, MnO 0·49, MgO 1·46, CaO 0·62, $P_2O_5$ 42·20, $H_2O+$ 5·66, $H_2O-$ 0·07, =99·92, and for the lazulite (impurities; 0·20% quartz, 0·31% rutile) $SiO_2$ 0·20, $TiO_2$ 0·31, $Al_2O_3$ 31·19, $Fe_2O_3$ 0·04, FeO 8·40, MnO 0·12, MgO 8·56, CaO 0·04, $P_2O_5$ 44·74, $H_2O+$ 6·16, $H_2O-$ 0·10, =99·86. The scorzalite is strongly pleochroic with α colourless, β=γ azure; twinning, usually polysynthetic, on {101}; cleavage {110}; α 1·645, β 1·674, γ 1·680, $2V_\alpha$ 64°, O.A.P. (010); sp. gr. 3·36. The lazulite is a lighter blue, and has α 1·619, β 1·649, γ 1·655, $2V\alpha$ 67°, sp. gr. 3·18. X-ray powder spacings are listed for both minerals. [M.A. **10**–254, **11**–244, **13**–370] R. A. H.

**Henriques (Å.).** *An iron-rich wagnerite, formerly named talktriplite, from Hållsjöberget (Horrsjöberget), Sweden.* Arkiv Min. Geol., 1957, **2**, 149–153.

A re-examination of talktriplite [Igelström, 1882] from the type locality at Hållsjöberget, Värmland, Sweden, where it occurs in kyanite-quartzite, has shown it to be an iron-rich wagnerite. It occurs with other phosphate minerals and has H. 5½; cleavage imperfect {100}, {120} and {010}; vitreous to resinous lustre: pleochroism α colourless to pale yellow, β=γ intense yellow; α 1·608, β 1·615, γ 1·630, $2V_\gamma$ 66°, $\beta=b$, $\gamma:c=53°$, sp. gr. 3·47: the X-ray powder spacings are listed and compared with those for wagnerite from Bamle, Norway. A chemical analysis by A. Parvel gave $SiO_2$ 1·23, $Al_2O_3+Fe_2O_3+TiO_2$ 2·23, FeO 13·36, MnO 7·72, MgO 27·93, CaO 3·81, $P_2O_5$ 37·38, F 6·56, $H_2O+$ 2·54, (less O for F 2·76), =100·00. The name iron-wagnerite is suggested [M.A. **3**–309, **8**–11, **11**–311, 350]. R. A. H.

**Staples (Lloyd W.).** *X-ray study of erionite, a fibrous zeolite.* Bull. Geol. Soc. Amer., 1957, **68**, 1847 (abstract).

Erionite from the type locality near Durkee, Oregon [Eakle, 1898], is orthorhombic with $a$ 6·625, $b$ 11·53, $c$ 15·12Å: these values agree with a general formula of $KNa(Ca,Mg)Al_4Si_{12}O_{32}.12H_2O$. The refractive indices $\alpha$ 1·468, $\beta$ 1·470, $\gamma$ 1·473 are higher than values previously published. R. A. H.

**Lindberg** (**Marie Louise**). *Leucophosphite from the Sapucaia pegmatite mine, Minas Gerais, Brazil.* Amer. Min., 1957, **42**, 214–221.

Leucophosphite occurs as minute buff crystals in vugs in frondelite in the Sapucaia pegmatite mine, Galilea, Rio Doce valley region, eastern Minas Gerais [M.A. **12**–131, 301, 408]. It has $\alpha$ 1·707, $\beta$ 1·721, $\gamma$ 1·739, biaxial +ve., $v>r$ very strong: it is monoclinic (pseudo-orthorhombic), space group $P2_1/n$, $a$ 9·73, $b$ 9·60, $c$ 9·69Å, $\beta$ 102°16′. X-ray diffraction data are listed together with possible indices. Analysis, by the author, gave $Fe_2O_3$ 41·02, $Al_2O_3$ 0·25, $Mn_2O_3$ 0·57, $K_2O$ 10·93, $Na_2O$ 0·53, $P_2O_5$ 34·71, $H_2O$ 11·20, insol. 0·45, = 99·66 [M.A. **11**–8]. R. A. H.

**Allen** (**Robert D.**) & **Kramer** (**Henry**). *Ginorite and sassolite from Death Valley, California.* Amer. Min., 1957, **42**, 56–61.

Ginorite and sassolite have been found closely associated in efflorescent masses in colemanite-veined basalt near the head of Twenty Mule Team Canyon, Death Valley. The ginorite is in rhomb-shaped plates with an acute angle of about 79°. It has $\alpha$ 1·520 (parallel to short diagonal), $\gamma$ 1·580 (parallel to long diagonal); sp. gr. 2·07: analysis by H. Kramer gave $B_2O_3$ 64·47, CaO 14·39, SrO 1·09, $H_2O+$ 18·91, rem. 1·48, = 100·34, giving a formula $2(CaO,SrO).7B_2O_3.8H_2O$. Sassolite occurs in pearly plates with $\alpha$ 1·340, $\beta$ 1·457, $\gamma$ 1·459, $2V_a$ calc. 14°, and wavy extinction: analysis gave $B_2O_3$ 57·19, $H_2O$ 42·81 (by diff.), = 100·00. X-ray powder spacings and intensities are listed. [M.M. **29**–555; M.A. **5**–484] R. A. H.

**Richter** (**D. H.**), **Reichen** (**Laura E.**), & **Lemmon** (**D. M.**). *New data on ferritungstite from Nevada.* Amer. Min., 1957, **42**, 83–90.

A yellow ochreous mineral from cavities in a limonitic gossan, Nevada Scheelite mine, Nevada, was shown to have an identical X-ray diffraction pattern to ferritungstite from the type locality, Germania mine, Washington [M.M. **16**–35], It is tetragonal, commonly dipyramidal, refr. ind. 2·09–2·15. sp. gr. 5·2, probable cell dimensions $a$ 10·28, $c$ 7·28Å: analysis gave $WO_3$ 67·70, $Fe_2O_3$ 6·84, FeO 6·07, CaO [illegible] $H_2O$ 7·01, $SiO_2$ (quartz) 6·56, = 99·80, yielding the form $Ca_2Fe_2^{II}Fe_2^{III}(WO_4)_7.9H_2O$ on recalculation free [illegible] quartz. [M.A. **7**–551, **10**–130] R. A. [illegible]

**Lapham** (**Davis M.**). *Epidote from Hawleyville, Connect* Amer. Min., 1957, **42**, 62–72.

Colourless to yellow-brown epidote occurs in a chlorite–apatite–orthoclase pegmatite along fracture pl of the Brookfield diorite at Hawleyville, Connect [M.A. **7**–258]. The epidote has a radiating prismatic h with sp.gr. 3·321, $\alpha$ 1·726, $\beta$ 1·735, $\gamma$ 1·741, $2V_a>$ pleochroism $\alpha$ colourless, $\beta$ occasional faint pale [illegible] $\gamma$ colourless to neutral; rare polysynthetic twins on ( Analysis by W. H. Herdsman gave $SiO_2$ 37·96, $Al_2O_3$ 2 $Fe_2O_3$ 8·88, FeO 0·97, MnO 0·16, CaO 22·07, MgO $H_2O+$ 2·14, $H_2O-$ 0·08, = 99·94. X-ray powder data listed and compared with the spacings and intens obtained for zoisite, clinozoisite, and other epidotes. suggested that the mineral name epidote be restricte material which is optically negative. A mineraliza unrelated to the diorite or subsequent pegmatite forma gave thin coatings of stilbite with the unusually refractive indices $\alpha$ 1·485, $\beta$ 1·490, $\gamma$ 1·493. [M.M. **14**– **28**–505; M.A. **1**–346, **7**–364] R. A.

**Clifford** (**Tom N.**). *Fuchsite from a Silurian(?) q conglomerate, Acworth Township, New Hamps* Amer. Min., 1957, **42**, 566–568.

A lenticular pod of the emerald-green chromian musc fuchsite was found in a quartz conglomerate within staurolite zone of metamorphism. The fuchsite has $\alpha$ 1 $\beta$ 1·597, $\gamma$ 1·602, $2V_a$ 38°, $\alpha$ colourless to light em green, $\beta$ green, $\gamma$ dark emerald green, sp. gr. 2·85: in s tural type it compares favourably with the $2M_1$ musc [M.M. **31**–209]. An analysis by J. Ito on 19·3 mg. $SiO_2$ 44·4, $TiO_2$ 2·1, $Al_2O_3$ 31·7, FeO 2·3, $Cr_2O_3$ 2·1, MnO MgO 0·7, CaO 0·1, $Na_2O$ 1·1, $K_2O$ 10·7, $H_2O+$ 4·7, = 9 [M.A. **6**–47, **10**–341] R. A.

**Huang** (**W. T.**). *Titanoclinohumite from the W Mountains, Oklahoma.* Amer. Min., 1957, **42**, 686– Titanclinohumite occurs in altered gabbroic rock Iron Mountain and is associated with phlogopite, sp grossular, diopside and epidote: it is considered to be to the contact action of granophyric melt conta fluorine upon the gabbroic rocks. The titanclinohu

α 1·702, β 1·709, γ 1·728, $2V_\gamma$ 52–72°, inclined dispersion weak to distinct ; *a* 13·63, *b* 4·80, *c* 10·12Å, β 101° 44′ ; Z = 6½. Partial data of chemical analysis of titanoclinohumite from Iron Mountain, north-west of Meers, Oklahoma, $TiO_2$ 2·45, $Fe_2O_3$ 1·20, FeO 11·25, F 1·02, $H_2O+$ 1·05. [M.A. **8**–85, **11**–406] R. A. H.

**Foshag** (**William F.**) & **Appleman** (**Daniel E.**). *Umohoite from the Lucky MC Mine, Wyoming.* Amer. Min., 1957, **42**, 657–660.

A new occurrence of the hydrous uranium–molybdenum mineral umohoite is recorded from uranium deposits in the arkosic sandstones of the Wind River formation. Is monoclinic, space group $P2_1$ or $P2_1/m$ ; *a* 14·30, *b* 6·40, *c* 6·38Å, β 99° 05′ ; indexed X-ray powder diffraction data are listed. The unaltered crystals are splendent blue black or dark green, with α (calc.) 1·66, β 1·831, γ 1·915, $2V_\gamma$ 85°, pleochroism α dark blue, β light blue, γ olive green, dispersion $r > v$ : the optic orientation is α : $a = 9°05'$, β ∥ *b*, γ ≈ *c*. [M.A. **12**–239] R. A. H.

**Frondel** (**Gretta S.**) & **Sand** (**L. B.**). *X-ray powder data for ulexite and halotrichite.* Amer. Min., 1957, **42**, 676–678.

X-ray diffraction powder data are listed for ulexite from California and Chile and for halotrichite from California. Chemical analysis of ulexite from Boron, California, gave CaO 7·8, CaO 14·2, $B_2O_3$ 43·7, $H_2O$ 34·2, = 99·9, while halotrichite from White Mountains, California, had FeO 6·8, $Al_2O_3$ 12·0, $SO_3$ 37·1, $H_2O$ 43·8, = 99·7. R. A. H.

**Hurlbut** (**Cornelius S., *Jr.***). *Zincian and plumbian dolomite from Tsumeb, South-West Africa.* Amer. Min., 1957, **42**, 798–803.

A study of zincian–plumbian dolomites from Tsumeb showed that with increasing percentage of ZnO the temperature of the first endothermic reaction on the d.t.a. curve shows a progressive decrease, while with increasing PbO a progressive decrease is observed in the temperature of the second endothermic reaction. Chemical analyses by J. Ito are of zincian–plumbian dolomites which are **A**, flesh coloured, massive, associated with chalcocite, native copper, and limonite ; **B**, white, massive, associated with malachite and limonite (CuO in analysis assumed to be due to malachite) ; **C**, light grey, crystalline, associated with malachite, native copper, and limonite : **D**, pink, massive and crystalline, associated with malachite ; **E**, flesh-coloured, crystalline. To make the analyses conform with the dolomite type formula it is necessary to group Zn, Fe and Mn with Mg, while Pb substitutes for Ca.

| | CaO | MgO | ZnO | FeO | MnO | CoO | CuO | PbO | $CO_2$ |
|---|---|---|---|---|---|---|---|---|---|
| A | 29.33 | 18.30 | 4.48 | 0.44 | 0.41 | 0.10 | 0.06 | 0.58 | 45.58 |
| B | 27.74 | 17.78 | 3.23 | 0.66 | 0.27 | — | 1.73 | 3.75 | 43.95 |
| C | 27.77 | 14.34 | 8.74 | 0.12 | 0.09 | — | 0.15 | 4.96 | 43.56 |
| D | 29.74 | 15.03 | 6.80 | 0.18 | 0.30 | 0.53 | 0.97 | 0.70 | 45.48 |
| E | 28.13 | 14.78 | 8.31 | 2.16 | 0.27 | 0.10 | 0.09 | 1.06 | 44.32 |

| | $H_2O$ | insol. | Total | ω | ε | sp. gr | H. | *a* | *c* |
|---|---|---|---|---|---|---|---|---|---|
| A | — | 0.69 | 99.97 | 1.690 | 1.520 | 2.90 | 4 | 4.806Å | 3.327Å |
| B | — | 0.94 | 100.05 | 1.698 | 1.519 | 2.93 | 3½ | 4.804 | 3.332 |
| C | — | — | '99.51' | 1.703 | 1.520 | 3.08 | 3½ | 4.808 | 3.343 |
| D | — | — | 99.73 | 1.699 | 1.519 | 2.93 | 3½ | 4.816 | 3.334 |
| E | 0.27 | 0.40 | 99.89 | 1.700 | 1.521 | 2.95 | 4 | 4.814 | 3.330 |

[M.A. **6**–228, 529, **11**–457, 536] R. A. H.

# NEW MINERALS

**Fleischer** (**L. J.**). *Twenty-first list of new mineral names.* Min. Mag., 1958, **31**, 951–977.

With the 21 triennial lists (1897–1958) 3363 names have been collected since the publication in 1892 of the sixth edition of Dana's 'System of Mineralogy'. L. J. S.

**Ginshtedt-Kupletskaya** (**E. M.**)] Бонштедт-Куплетская (Э. М.). Новые минералы, IV [*New minerals. IV.*] Зап. Всесоюз. Мин. Общ. (Mem. All-Union Min., Soc. 1957, ser. 2, **86**, 116–130.

- [*New minerals. V.*] Ibid., 1957, **86**, 375–381.

- [*New minerals. VI.*] Ibid., 1958, **87**, 76–84.

- [*New minerals. VII.*] Ibid., 1958, **87**, 476–493.

Continuations. [M.A. **13**–84, 378, 521] L. J. S.

**Guillemin** (**C.**) & **Permingeat** (**F.**). *Revue des espèces minérales nouvelles.* Bull. Soc. franç. Min. Crist., 1957, **80**, 209–228, 378–394, 528–542 ; 1958, **81**, 65–71, 154–161, 238–240.

Continuations [M.A. **13**–84, 378] L. J. S.

**Schüller** (**A.**). *Neue Minerale.* 10. *Fortsetzung.* Geologie. Zeits., East Berlin, 1957, **6**, 338–343.

Continuation [M.A. **13**–84] L. J. S.

[**Grigoriev** (**Iv. F.**) & **Dolomanova** (**E. I.**)] Григорьев (Ив. Ф.) и Доломанова (Е. И.). Смирновскит — новый минерал из группы водных фторо-силико-фосфатов тория. [*Smirnovskite—a new mineral of the group of hydrous fluoro-silico-phosphates of thorium.*] Зап. Всесоюзн. Мин. Общ. [Mem. All-Union Min. Soc.], 1957, **86**, 607–621, 9 figs.

In 1938 a new mineral " thorium phosphate ", so named by O. D. Levitzky, was discovered in a tinstone vein in Etkin deposit, eastern Transbaikal region. The present authors in conjunction with O. D. Levitzky are proposing the name smirnovskite (in honour of S. S. Smirnov) for this mineral. Smirnovskite occurs in association with cassiterite and topaz of the first and second generations. Its crystalline form is not clear ; the habit appears to be prismatic with rectangular and square outlines. Colourless to brownish, lustre waxy, fracture conchoidal, H. ~ 5, sp.gr. 4·68, isotropic (often metamict) $n$ 1·685 to 1·718 ; anisotropic varieties $\omega$ 1·678, $\epsilon$ 1·682, uniaxial, positive, elongation positive, extinction straight. Probably tetragonal. Two chemical analyses gave : $ThO_2$ 51·20, 59·00, rare earths 7·90, 0·84, CaO 3·90, 4·10, MgO 0·22, 0·21, $Na_2O+K_2O$ 1·00, n.d., $Fe_2O_3$ 1·05, 2·80, $Al_2O_3$ 0·79, 2·87, $SiO_2$ 6·54, 9·75, $P_2O_5$ 17·80, 9·01, F 5·02, 3·58, 1st analysis $H_2O+$ 6·87, $H_2O-$ 5·40, $U_3O_8$ 0·10, = '102·39' — $F_2$ for O 2·09 = 100·30, 2nd analysis $H_2O\pm$ 9·25, total 101·41 — $F_2$ for O 1·41, = 100·00. X-ray and spectroscopic data are also given. [A.M. **43**–386 ; M.M. **31**–972] S. I. T.

[**Gotman** (**Ya. D.**) & **Khapaev** (**I. A.**)] Готман (Я. Д.) и Хапаев (И. А.). Торутит — новый минерал из группы титанатов тория. [*Thorutite—a new mineral of the group of thorium titanates.*] Зап. Всесоюз. Мин. Общ. [Mem. All-Union Min. Soc.], 1958, **87**, 201–202.

This mineral was discovered by the authors in 1947 in a microcline–nepheline vein cutting through syenite, a vein in which nepheline is almost entirely replaced by sericite. It was already described by Melkov & Pukhalsky [see following abstract], but in the present paper a fuller chemical analysis is given : $SiO_2$ 0·44, $TiO_2$ 36·1, $Fe_2O_3$ 1·10, $Al_2O_3$ 1·50, $Nb_2O_5$ 1·12, $Ta_2O_5$ 0·08, $ThO_2$ 54·10, $UO_2$ 1·43, $UO_3$ 0·14, CaO 1·07, ign. loss 1·72, $H_2O$ 0·94, = 99·74.

S. I. T.

[**Melkov** (**V. G.**) & **Pukhalsky** (**L. C.**)] Мелков (В. Г.) и Пухальский (Л. Ч.). [Поиски месторождений урана. *The search for uranium deposits.* Госгеолтехиздат [Gosgeoltekhizdat], 1957.] Abstract in Mem. All-Union Min. Soc., 1958, **87**, 79.

The names smirnovite (after S. S. Smirnov) or thorutite (after composition) are given to a black metamict mineral found in druses and veinlets, H. 5—6, sp.gr. 5·82, which on partial analysis gave $UO_2$ 1·43, $UO_3$ 0·14, $ThO_2$ 54·1, Ln tr., $Fe_2O_3$ tr., $TiO_2$ 36·1, $H_2O$, ? corresponding to $2[Th,U,Ca)Ti_2O_6].H_2O$. [M.M. **31**–972 ; A.M. **43**–1007]

The name usihyte (after composition) is given to a yell radial-fibrous mineral in composition corresponding $R(UO_2)_2.Si_2O_7.nH_2O$, but no detailed description is gi [M.M. **31**–974 ; A.M. **43**–1008] S. I. T

[**Getzeva** (**R. V.**) & **Savelieva** (**K. T.**)] Гецева (Р. В Савельева (К. Т.). [Руководство по определе урановых минералов. *A manual for the determina of uranium minerals.* Госгеолтехиздат [Gosgeolte izdat.], 1956]. Abstract in Mem. All-Union Min. S 1958, **87**, 79.

Obruchevite (after V. A. Obruchev) is the name gi to a light brown metamict mineral belonging to pyrochlore group occurring in granite pegmatite : pit lustre, sp. gr. 3·96–4·8, cubic system : chemical anal $Na_2O$ 4·42, $K_2O$ 0·48, CaO 2·86, FeO 3·85, $Ce_2O_3$ $Y_2O_3$ 19·14, $UO_2$ 5·98, $ThO_2$ 0·80, $TiO_2$ 0·40, $Ta_2O_5$ 4 $Nb_2O_5$ 10·06, $SiO_2$ 1·78, $H_2O$ 8·90, = 99·05, correspondin $3Na_2O.4(Ca,Fe)O.3Y_2O_3.(U,Th)O_2.5(Ta,Nb)_2O_5.20H_2O$. [M.M. **31**–969 ; A.M. **42**–307, **43**–380] S. I. T

[**Khalifa-Zade** (**Ch. M.**)] Халифа-Заде (Ч. М.). [О но разновидности гидрослюды из аргиллитов байоса восточного Кавказа. *On a new variety of hydro from a Bajocian argillite in the South-eastern Cauca* ДАН Азерб. ССР. [C. R. Acad. Sci. Azerbajan S 1957, **13**, 6, 647–653.] Abstract in Mem. All-U Min. Soc., 1958, **87**, 83.

Gyulekhite (after the village of Gyulekh) is the n given to a variety of hydromica, $\alpha'$ 1·543, $\gamma'$ 1·552, posi elongation, endothermic stops at 130°, 390°, and 56 Chemical analysis $SiO_2$ 31·14, $Al_2O_3$ 14·50, $Fe_2O_3$ 2 FeO 3·52, MgO 4·00, $Na_2O$ 0·15, $K_2O$ 3·71, $H_2O+$ $H_2O-$ 3·31, = 98·28 ; X-ray data also given. [M.M. **31**– A.M. **43**–1223] S. I.

**Garavelli** (**Carlo L.**). *Bonattite : un nuovo mineral alterazione del giacimento elbano di Capo Calar* Rend. Soc. Min. Ital., 1957, **13**, 269.

Analysis of the material (data not given) corresp with 85% of $CuSO_4.3H_2O$ and 15% $CuSO_4.5H_2O$. Re tive index, 1·578–1·601, is compared with $\alpha$ 1·554, $\beta$ 1 $\gamma$ 1·618 for the artificial monoclinic $CuSO_4.3H_2O$. [ **4**–306 ; A.M. **43**–180] L. J.

**Davidson** (**C. F.**). *Radiogeology in Russia.* Mining M 1957, **97**, 265–272.

A review of some recent research with mentio

mic radiogeology, prospecting techniques, radio-ty of rocks and geochronology. Details are given for l new minerals including : *lodochnikite* [properties are on p. 14 ; refr. ind. > 2·1. M.M. **31**–965 ; A.M. **43**–389] occurs with chalybite, hematite, and baryte in ation with alkaline eruptive rocks ; *moluranite* [p. 13 ; **31**–967 ; A.M. **43**–380] is associated with brannerite lters to an earthy yellow molybdate of hexavalent um, the new species *iriginite* [p. 14 ; M.M. **31**–962 ; **43**–379] ; *lermontovite* [p. 13 ; M.M. **31**–965 ; A.M. 9] occurs in the zone of secondary enrichment of ferous molybdenite veins and is stable only under ing conditions ; other new secondary minerals, *valskite* [p. 13 ; M.M. **31**–970 ; A.M. **43**–381], a brown-llow "uranium mica," and *orlite*, a hydrated plumbo-te of uranium apparently differing from kasolite in a r silica content and lower refractive indices [p. 13 ; **31**–969 ; A.M. **43**–381]. Of other new species *ufertite* tatively considered to be a variety of davidite [p. 14 ; **31**–974 ; A.M. **43**–378] R. A. H.

**nan (Y. D.)**] Готман (Я. Д.). Лодочникит — новый инерал из группы титанатов урана и тория. [*Lodoch-nikite—a new mineral of the group of uranium and horium titanates.*] Зап. Всесоюз. Мин. Общ. [Mem. All-Union Min. Soc.], 1958, ser. 2, **87**, 197–200.

is mineral was discovered by the author in 1947 in a composed of microcline, nepheline and muscovite, ng syenite. It has already been described by Soboleva dovkina [see p. 14 and preceding abstract]. X-ray and ical data suggest a resemblance to brannerite. [M.M. 65 ; A.M. **43**–380] S. I. T.

**eau (J.).** *Sur un mineral de la famille des 'Dufrénites' dans la pegmatite de Kobokobo (Congo Belge).* Bull. Acad, roy. Belgique, Cl. Sci., 1957, sér. 5, **43**, 705–710.

scription of a new member of the series rockbridgeite-lelite for which the author proposes the name *kobokobite*. curs as crusts with a radiating-fibrous structure or as egates of needles and is deep green (A) or brown due xidation (B), the analyses being by P. Ronchesne, , MgO and $Al_2O_3$ were not determined.

| FeO | MnO | $Fe_2O_3$ | $Mn_2O_3$ | $P_2O_5$ | $H_2O$ | Insol. | Total |
|---|---|---|---|---|---|---|---|
| 9.36 | 8.40 | 41.33 | — | 32.20 | 8.38 | — | 99.67 |
| — | 4.14 | 49.21 | 4.96 | 31.67 | 10.90 | — | 100.88 |

ne green variety has γ perp. to the perfect cleavage β along the length, α 1·798, β 1·820, 2V very large, ably positive, very marked pleochroism with α clear n or slightly bluish, β pale brown. The brown variety has α along the length, α 1·86, β ⩾ 1·88, pleochroic with β very deep brown, α pale brown. The powder diagram which is given shows a close resemblance to that of rockbridgeite-frondelite. [A.M. **43**–795.] J. M.

**Kostov (Ivan).** *Bonchevite, $PbBi_4S_7$, a new mineral.* Min. Mag., 1958, **31**, 821–828.

Bonchevite is found in quartz-scheelite veins traversing gneisses and amphibolites near the Yugovo granite, central Rhodope mountains, southern Bulgaria. It occurs as acicular or prismatic orthorhombic crystals with forms {110}, {100}, {010}, and {011} ; axial ratio $a : b : c = 0{\cdot}9004 : 1 : 0{\cdot}3249$ ; sp. gr. 6·92 ; H. ≈ 2½ ; perfect {100} cleavage ; distinct anisotropism ; analysis by N. Yordanov gave Bi 66·62, Pb 15·50, Cu 0·85, S 16·71, = 99·68. X-ray powder data are tabulated for bonchevite : the name is after the Bulgarian mineralogist and petrographer G. Bonchev. [M.M. **31**–954 ; A.M. **43**–1221] R. A. H.

[**Buryanova (E. Z.), Kovalev (G. A.), & Komkov (A. I.)**] Бурьянова (Е. З.), Ковалев (Г. А.) и Комков (А. И.). Новый минерал кадмоселит. [*A new mineral cadmoselite*]. Зап. Всесоюзн. Мин. Общ. [Mem. All-Union Min. Soc.], 1957, **86**, 626–628.

A new name, cadmoselite, is given to the natural CdSe compound. This mineral occurs in the form of small grains which are a combination of a hexagonal pyramid with the basal plane. These are found in the cementing material of a sandstone [locality ?]. The mineral is black, very brittle, and hardness moderate. X-ray powder photographs are similar to those of artificial CdSe. Unit-cell dimensions $a$ 4·262, $c$ 6·955 kX. [A.M. **43**–623.] S. I. T.

**Stern (T. W.), Stieff (L. R.), Evans (H. T., *Jr.*), & Sherwood (A. M.).** *Doloresite, a new vanadium oxide mineral from the Colorado plateau.* Amer. Min., 1957, **42**, 587–593, 1 fig.

A new mineral has been identified from eleven mines on the Colorado Plateau where it occurs in slightly oxidised vanadium ores, intermixed chiefly with paramontroseite [M.A. **13**–9] which it replaces : it is named doloresite for the Dolores River in south-western Colorado. Doloresite is grey and strongly anisotropic in reflected light, reddish-yellow in very thin flakes with a mean refr. ind. ≈ 1·90, sp. gr. 3·27–3·33 (3·41 calc.). Single crystal X-ray studies showed that it is monoclinic, with space group $C2/m$, $a$ 19·64, $b$ 2·99, $c$ 4·83Å, β 103° 55′ : analyses of a mixture of doloresite, montroseite, and paramontroseite together

with consideration of the unit cell indicate a cell content of $H_8V_6O_{16}$. Lamellar twinning, twin plane (100), is almost universal on a submicroscopic scale: the indexed X-ray powder pattern is given. R. A. H.

[**Tikhonenkov** (**I. P.**) & **Kazakova** (**M. E.**)] Тихоненков (И. П.) и Казакова (М. Е.). Ниоболопарит — новый минерал из группы перовскита. [*Nioboloparite—a new mineral of the perovskite group.*] Зап. Всесоюз. Мин. Общ. [Mem. All-Union Min. Soc.], 1957, **86**, 641–644, 3 figs.

The mineral called nioboloparite is found in an alkali pegmatite in the Khibina tundra in association with natrolite and other minerals. It occurs in the form of well-formed crystals, usually as cubo-octahedrons. Colour black, but central part of crystals is often reddish-brown streak grey-brown, lustre bright metallic, fracture conchoidal, no cleavage, H. 5·5—6, sp.gr. 4·657, isotropic $n \approx 2{\cdot}35$. X-ray data show an affinity to perovskite and loparite. Chemical analysis gave $TiO_2$ 32·01, $(Nb,Ta)_2O_5$ 26·26, $Ce_2O_3$ 25·55, $ThO_2$ 1·16, FeO 0·94, CaO 1·32, MgO 0·18, $Na_2O$ 10·53, $K_2O$ 0·80, $H_2O$ 0·85, = 99·60. Structural formula: $(Na_{0\cdot59}Ce_{0\cdot27}Ca_{0\cdot09})(Ti_{0\cdot67}Nb_{0\cdot33})O_{2\cdot87}(OH)_{0\cdot13}$. [M.M. **31**–968; A.M. **43**–792.] S. I. T.

[**Petrova** (**E. S.**)] Петрова (Е. С.). Новый водный борат кальция — фроловит. [*A new hydrous borate of calcium—frolovite.*] Зап. Всесоюзн. Мин. Общ. [Mem. All-Union Min. Soc.], 1957, **86**, 623–625, 3 figs.

Frolovite, named after its place of occurrence, the Novo–Frolovsk copper deposit in the northern Urals, is a new variety of hydrous calcium borate. On analysis it gave $SiO_2$ 0·57, $B_2O_3$ 34·20, $Fe_2O_3$ 0·10, MgO 0·72, CaO 28·70, $H_2O$ 32·96, $SO_3$ 1·78, = 99·03. The formula is $CaB_2O_4.3{\cdot}5H_2O$. Greyish white, lustre dull, semi-transparent in thin fragments H. 3·5, sp.gr. 2·14, not soluble in water, soluble in acids on heating. Aggregate extinction, biaxial, positive, 2V ~ 75°, $\alpha$ 1·572, $\gamma$ 1·586. Endothermal peak at 190°C. Occurs in a contact-metasomatic copper deposit in association with calciborite, calcite, garnet, magnetite, and other minerals. [M.M. **31**–959; A.M. **43**–385] S. I. T.

**Gard** (**J. A.**) & **Taylor** (**H. F. W.**). *Okenite and nekoite (a new mineral).* Min. Mag., **31**, 5–20, 5 figs., 1 pl.; authors' abstract, Min. Abstr., **13**, 29.

A mineral from Crestmore, California, identified by Eakle as okenite has been shown to be a new mineral. Since the chemical composition and optical properties are similar to, and the unit-cell dimensions are related to of okenite, the name nekoite—an anagram of okenite been assigned. Nekoite has $SiO_2$ 56·17, CaO 26·10, 16·83, W. F. Foshag anal. It occurs as needles wit good cleavage, ‖ (100), shows repeated twinning with ellae parallel to cleavage, mean refr. ind. 1·535 ± 0·002 very low birefringence, $2V_\gamma$ 70° approx., $\alpha$: (needle about 26°, $\gamma$ roughly normal to cleavage; system ano $a$ 9·86, $b$ 7·32, $c$ 7·60Å, $\alpha$ 111° 48′, $\beta$ 86° 12′, $\gamma$ 103° 54 contents $3\{CaO.2SiO_2.2H_2O\}$. [M.M. **31**–967; A.M. **41**– J.

**Jones** (**L. H. P.**) & **Milne** (**A. A.**). *Birnessite, a manganese oxide mineral from Aberdeenshire, Sco* Min. Mag., **31**, 283–288; authors' abstract, Min. A **13**, 237.

The mineral occurs as black grains in a manganes in fluvioglacial gravel at Birness, 20 miles N. of Aber H. 1½, sp.gr. 3·0; nearly opaque, dark brown; refr variable, approx. $\varepsilon$ 1·69, $\omega$ 1·73; powder data g chem. anal. of the pan, $SiO_2$ 18·92, $Al_2O_3$ 3·32, $Fe_2O_3$ $MnO_2$ 54·24, MnO 4·66, CaO 1·65, $Na_2O$ 2·17, $TiO_2$ $H_2O+$ 4·99, $H_2O-$ 5·88, includes quartz 20, clay 7·3, b site 5·2, rutile 0·1, birnessite 67·4%; formula of birn is close to $(Na_{0\cdot7}Ca_{0\cdot3})Mn_7O_{14}.2{\cdot}8H_2O$. Birnessite naturally occurring $\delta$-$MnO_2$. [M.M. **31**– 954; A.M. **42**– J. Ph

**Sahama** (**Th. G.**) & **Hytönen** (**K.**). *Götzenite and Co two new silicates from the Belgian Congo.* Min. **31**, 503–510; authors' abstract, Min. Abstr., **13**, 5

These minerals occur among the principal mineral nephelinite from the inner wall of the Shaheru crater, Kivu. Götzenite forms prismatic crystals with cle perfect ‖ (100), and good ‖ (001), lamellar twinning twin axis $b$, composition plane ⊥ (001); colourle thin section, $\alpha$ 1·660, $\beta$ 1·662, $\gamma$ 1·670, $2V\gamma$ 52°, disp strong; triclinic; on (010) $\gamma'$: (trace of $c$) 58° app sp.gr. 3·138; easily soluble in hot dilute HCl; $SiO_2$ $TiO_2$ 9·72, $Al_2O_3$ 4·26, $Fe_2O_3$ 0·35, FeO 0·45, MnO MgO 0·29, CaO 41·80, BaO 0·09, SrO 0·00, $Na_2O$ $K_2O$ 0·14, $P_2O_5$ 0·01, $CO_2$ 0·00, F 8·33, Cl 0·15, $SO_3$ $H_2O+$ 0·26, $H_2O-$ 0·14, = 103·60, less 3·54 O for F,C 100·06; $a$ 10·93 ± 0·05, $b$ 7·32 ± 0·03, $c$ 5·74 ± 0·03Å, $\beta$ 100° ± 1′, $\gamma$ 120° ± 1°, volume 389Å³, $a:b:c$ 1·4 0·784; unit cell contents approx. $(Ca,Na,Al)_7(Si,Ti)_5O_1$ related to rinkite series. [M.M. **31**–961; A.M. **43**–790.]

Combeite is rhombohedral, generally poorly deve

als, occasionally hexagonal prisms are seen in thin on ; has no cleavage, is colourless with $\epsilon \approx \omega$ 1·598± ; $D_4^{20}$ 2·844 ; $SiO_2$ 49·78, $TiO_2$ 0·32, $ZrO_2$ 0·44, $_3$ 2·45, $Fe_2O_3$ 1·86, FeO 0·54, MnO 0·58, MgO 0·41, 22·68, BaO 0·09, SrO 0·00, $Na_2O$ 16·14, $K_2O$ 1·18, 0·02, $CO_2$ 0·00, F 1·87, Cl 0·30, $SO_3$ 0·19, $H_2O+$ 1·39, — 0·42, = 100·66, less O 0·86, 99·80, giving unit cell ox. $3[Na_4(Ca,Al,Fe)_3Si_6O_{16}(O,OH,F)_2]$ ; *a* 10·43, *c* 4±0·03Å, volume 1238Å$^3$, space group *R*3*m*, *R*32 or . [M.M. **31**–956 ; A.M. **43**–791] J. Ph.

**ish (K.), Rogers (L. E. R.), & Shapter (R. E.).** *Kingite, a new hydrated aluminium phosphate mineral from Robertstown, South Australia.* Min. Mag., **31**, 351–357, 3 figs. ; authors' abstract, Min. Abstr., **13**, 236.

ie mineral occurs fairly pure as white nodules up to ches diameter in phosphate deposits associated with brian and Upper Precambrian limestones in fault zones. kingite is in the form of a soft, white powder, mean refr. 1·514 ; sp. gr. values obtained 2·21, 2·20, 2·30 ; analysis $Al_2O_3$ 31·92, $P_2O_5$ 28·63, $Na_2O$ 0·47, $K_2O$ 0·01, F 0·84, Cl trace, ign. loss 36·52, loss at 110°C 2·71, insol. 0·02, = 101·12, loss at 98°C 1·3 ; corrected under various assumptions, $Al_2O_3$ 32·25, $P_2O_5$ 28·93, F 0·85, $H_2O+$ 38·32, = 100·35, corresponding to $Al_2O_3.Al(OH)_3.P_2O_5.9H_2O$ with some replacement of OH by F. A weight-loss curve is given ; formation of a new phase, meta-kingite $Al_3(PO_4)_2(OH_3).4H_2O$, is complete at 160°C. X-ray powder diffraction and d.t.a. data are given. [M.M. **31**–964, 966 ; A.M. **42**–580] J. Ph.

**Claringbull (G. F.), Hey (M. H.), & Payne (C. J.).** *Painite a new mineral from Mogok, Burma.* Min. Mag. **31**, 420–425, 5 figs. ; authors' abstract, Min. Abstr., **13**–238.

A deep garnet-red crystal from gem gravel has H. about 8, $\omega$ 1·8159, $\epsilon$ 1·7875 (Na), $\omega$ pale brownish-orange, $\epsilon$ ruby red ; sp. gr. 4·00±0·02 ; $Al_2O_3$ 76·2, $SiO_2$ 5·6, $B_2O_3$ 2·2, CaO 15·7, $H_2O$ 0·7, $Fe_2O_3$ tr., MnO tr., = 100·4 ; hexagonal unit cell *a* 8·725, *c* 8·46Å, space group $P6_3$, $P6_3/m$ or $P6_322$ ; contains approx. 38 O, suggesting a cation content $Ca_4SiBAl_{20}$ but formula and relationships are uncertain. [M.M. **31**–969 ; A.M. **42**–580] J. Ph.

## PHYSICAL PROPERTIES OF MINERALS

**ayson (D. M.) & Greig (D.).** *Electrical measurements on natural galena at low temperatures.* Proc. Phys. Soc. London, Sect. B, 1956, **69**, 796–801.

easurements of Hall effect and resistivity, between temperature and boiling point of helium, for crystals atural galena covering a considerable impurity range. ussion of results, in terms of band theory, is inconclusive. W. H. T.

**oweth (A. G.).** *The pyroelectric behaviour of colemanite.* Acta Cryst., 1957, **10**, 511–514, 3 figs.

xperiments in the range between liquid helium erature and 100°C show that above —6°C colemanite t pyroelectric, while below, it is pyroelectric and electric. [M.A. **12**–208, **13**–378] J. Z.

**epohl (P. T.).** *Electrical and optical properties of type IIb diamonds.* Proc. Phys. Soc. London, Sect. B, 1957, **70**, 177–185. 5 figs.

sistivity and other measurements have been made on emi-conducting diamonds of type IIb. Certain peaks eir infra-red absorption spectra are not found in the ra of diamonds of types I and IIa [M.A. **12**-165] R. A. H.

**Wenden (Henry E.).** *Ionic diffusion and the properties of quartz. I. The direct current resistivity.* Amer. Min., 1957, **42**, 859–888, 16 figs.

The direct current resistivity of natural quartz for current flowing parallel to the *c* axis has been measured and the dependence of this axial resistivity upon temperature, field intensity, crystallographic orientation, and time of passage of current investigated. Discrepancies in previously reported values are considered to be due to the neglect of the factor of time of passage of current. When current is passed long enough to exhaust impurity-ion-connected mechanisms of conduction, the difference between axial and equatorial resistivity and the variation between different samples of quartz are of the same magnitude as the experimental error. R. A. H.

[**Melankholin (N. M.)**] Меланхолин (Н. М.). Об окрасках амфиболов. [*On the colouration of amphiboles.*] Зап. Всесоюз. Мин. Общ. [Mem. All-Union Min. Soc.], 1956, **85**, 218–223, 11 figs.

A spectrophotometric study of absorption curves of amphiboles. [M.A. **12**–595] S. I. T.

[**Sobolev** (**V. S.**)] Соболев (В. С.). Зависимость свойств силикатов от их структуры. [*The dependence of the properties of silicates on their structure.*] Геохимия. Изв. Акад. Наук СССР [Geochemistry, Bull. Acad. Sci. USSR], 1956, **6**, 49–60. S. I. T.

[**Komarov** (**A. G.**)]. Комаров (А. Г.). Остаточное намагничение горных пород и их возраст (палеомагнетизм и движение полюсов). [Residual magnetism of rocks and their age (palaeomagnetism and the movement of poles)] Изв. Акад. Наук СССР [Сер. Геол. [Bull. Acad. Sci. URSS], Sér. Géol.], 1957, **10**, 48–60, 2 figs.

This is a review of world data relating to the determination of palaeomagnetic age of rocks and the magnetism of the north pole. Additional data are provided for peridotites and quartz-diorite of the northern Urals, which are determined as being Silurian and Siluro-Devonian respectively in age, and also of "Siberian Traps", which are of Triassic age. S. I. T.

**Kawai** (**Naoto**). *Magnetism of earth crust.* Journ. Geomagnetism and Geoelectricity, 1957, **9**, 140–156, 8 figs.

That Ti-content in ferrites (magnetite-ulvöspinel and hematite-ilmenite series) increases with temperature [M.A. **10**–5] and pressure is demonstrated by a series of experiments carried out at pressures up to 6,000 atmos. and 550°C; at very high pressure (15,000 atmos. in the experiment) ferrite is unstable, the Fe and Ti being taken up in silicate. The apparatus is described. Tests showed the existence of remanent magnetism and the presence of ferrites in 93·2% of volcanic, in 17·8% of plutonic, and in 15·7% of metamorphic rocks: the total tested being 1828. The earth crust is conceived as comprising a ferromagnetic layer (10 km), a paramagnetic layer with ferrite (10–25 km) and a paramagnetic lower region without ferrite. The acquisition of remanent magnetism by a rock may be long after its formation because the ferrite formed originally under high pressure and temperature conditions may have had a low Curie point and may not have cooled below this point till some late orogeny, for example, raised it to shallower levels. From the Curie point and the composition of the ferrite of a plutonic rock the depth at which it was formed may be inferred; examples are given. J. Ph.

**Nicholls** (**G. D.**). *The mineralogy of rock magnetism.* Phil. Mag. (Advances in Physics), 1955, **4**, 113–190, 28 figs.

This paper reviews existing knowledge concerning the mineralogy and paragenesis of the ferrimagnetic minerals. Methods of study of the opaque minerals are br described and the oxide minerals of the system FeO–Fe $TiO_2$ and the effect of other cations in the structure of iron oxides are discussed at some length. The ferrimagn sulphide minerals are also considered, and the ferrimagn mineralogy of igneous, sedimentary, and metamor rocks is outlined. The stability of the ferrimagnetic o minerals subsequent to their initial formation is discussed. [M.A. **3**–217, **6**–43, 45, **11**–239, 382, **12**–32, 318] R. A. I

**Baldock** (**G. R.**). *Lattice vibrations and specific hea graphite.* Phil. Mag., ser. 8, 1956, **1**, 789–802.

A mathematical treatment of the thermal vibration atoms in the graphite structure leads to calculated va of the specific heat of graphite in fairly good agreem with observed values from 1·5°K to 1,000°K. The phy model represented by the mathematical formulatio explained very clearly. W. H.

**Benson** (**G. C.**) & **van Zeggeren** (**F.**). *Madelung cons of some cubic crystals.* Journ. Chem. Physics, **26**, 1083–1085.

The Madelung constants of fluorite and zinc-blende derived. R. A.

**Skinner** (**Brian J.**). *The thermal expansions of thoria, periclase and diamond.* Amer. Min., 1957, **42**, 39 6 figs.

The linear and volume thermal expansion coefficien thoria, periclase, and diamond have been determined a temperature range of 298° to 873° or 973°K. The cell sizes at 298·16°K and 1 atmosphere are: th $a$ 5·59525±0·0001Å, periclase $a$ 4·2117±0·0002Å, diamond $a$ 3·56888±0·00009Å. Molar volumes are calculated, and five replicate trace element determina are given for the single crystal of diamond used, South-West Africa. Details and drawings are given central mount, back reflection, X-ray powder ca designed for measuring thermal expansions: it h diameter of 16 cms. and a temperature range from 0 -1,0 [M.A. **9**–49, **10**–59, 210, **13**–255] R. A.

**King** (**E. C.**). *Low temperature heat capacities and entr at 298·15°K of cryolite, anhydrous aluminium fluo and sodium fluoride.* Journ. Amer. Chem. 1957, **79**, 2056–2057.

Cryolite from Greenland had an entropy valu

5°K of 57·0 ± 0·4 cal./deg. mole. Its heat capacity rious temperatures is listed and its partial analysis Na 32·76, Al 13·01, K 0·036, Li 0·007. R. A. H.

**lin (J. P.) & O'Brien (C. J.).** *High temperature heat ontents of calcium orthosilicate.* Journ. Physical hem., 1957, **61**, 767–769.

four crystalline varieties of $Ca_2SiO_4$ were investigated he entropies and heats of the β–α′, α′–α and γ′–α ormations have been evaluated [M.A. **11**–470]. R. A. H.

**ier (G.).** *Chaleurs de transition des formes de basse empérature aux formes de haute température du quartz, e la tridymite et de la cristobalite.* Bull. Soc. franç. lin. Crist., 1957, **80**, 444–449.

heats of transition for the low → high temperature of tridymite and cristobalite have been measured by For α → $\beta_1$tridymite the heat of transition is 0·43 ., for $\beta_1 \rightarrow \beta_2$tridymite 0·23 cal./g., and for α → tobalite 4·4 cal./g. These results are compared with of previous authors, and the relationship between the nt of heat developed and the change in volume panying the transformation is discussed. [M.A. **1**–367, **12**–122, 123] R. A. H.

**ques (Å.).** *The Vickers hardness of zinc blende.* rkiv Min. Geol. Stockholm, 1957, **2**, 283–297, 3 figs.

Vickers hardness of 21 polished specimens of zinc e has been determined and the methods used are bed. Chemical analyses (4 new) are given for all es. For 6 samples the crystallographic orientation aken into account, and it is shown that the hardness ds on the orientation of the sections and on the iron nt. An empirical equation relating Vickers hardness and iron content in weight % (C) is HV = A + B A and B being constants : for {001} A = 165, B = 16 ; 11} A = 187, B = 18 ; for {111} A = 193, B = 19. 001} HV ranges from about 128 (Fe ≈ 0·005%) ) (Fe ≈ 6%). The hardness is related to the crystal e and the density of packing varies with the orientation way which is consistent with the observed hardness ences [M.A. **29**–253]. K. F.

**ens (P. G.).** *Density changes in neutron irradiated uartz.* Phil. Mag., ser. 8, 1956, **1**, 938–941.

alitative discussion of explanations previously pro- for the observed rate of change of density in neutron-irradiated quartz. A new explanation is proposed in terms of the formation in the crystal of disordered regions which are in compression until plastic flow begins. W.H.T.

**Mitra (G. B.) & Gokhale (B. V.).** *Elastic and force constants of a simple tetragonal crystal.* Journ. Chem. Physics, 1957, **26**, 1655–1656.

The equations of motion of an atom along the three crystallographic axes of a monatomic simple tetragonal crystal have been set up. R. A. H.

**Handin (John), Higgs (D. V.), Lewis (D. R.), & Weyl (P. K.).** *Effects of gamma radiation on the experimental deformation of calcite and certain rocks.* Bull. Geol. Soc. America, 1957, **68**, 1203–1224, 19 figs., 4 pls.

Calcite single crystals, Yule marble, Hasmark dolomite, and several limestones were deformed dry at room temperature under constant confining pressures of 2000 or 2750 bars at a strain rate of 1% per minute. Irradiated single crystals changed from amber to blue when the greatest principal stress was parallel to the optic axis : no change occurred when the least principal stress was in this direction. Petrographic studies showed that the established principal deformation mechanisms, twin gliding on $e\{01\bar{1}2\}$ and translation gliding on $r\{10\bar{1}1\}$ were operative but that the blue colour which developed in irradiated deformed specimens was associated with translation gliding only : in Yule marble blue grains had deformed by translation, clear grains by twinning. A 17-megaroentgen gamma irradiation does not influence the yield strength of calcite single crystals, but does result in a several per cent. reduction of strength in Yule marble and various sedimentary rocks. Thermoluminescence studies indicate that compression along the optic axis yields a new peak in the glow curves (at 280°C.) not present in undeformed irradiated calcite : twin gliding enhances the 240°C. peak commonly found. [M.A. **12**–384–5, **13**–375–6] R. A. H.

**Denning (Reynolds M.).** *The grinding hardness of diamond in a principal cutting direction.* Amer. Min., 1957, **42**, 362–366, 2 figs.

A series of facets in zone [010] was ground on a diamond, the grinding direction being maintained parallel to the zone axis, and the cutting rates were determined. It was thus shown that the grinding hardness in this mineral is dependent on the orientation of the surface on which the measurement is made. The data are taken to imply that if it were

possible to develop a theory of grinding hardness in diamond, the simplest hardness model must be represented by a tensor of at least fourth order [M.A. **12**–166, 600].

R. A. H.

**Slawson (C. B.).** *Hardness of synthetic diamonds.* Amer. Min., 1957, **42**, 299–300.

A natural diamond was cut and polished close to the octahedron face, the plane in which the hardness reaches its highest value, by a fine powder of synthetic diamonds. A facet was eventually cut within 1°23′ of parallism with the octahedron and it is concluded that there is no difference in the actual hardness of natural and synthetic diamonds. A very few faint lines of an unknown impurity were observed on some X-ray powder patterns of the synthetic material. [M.A. **11**–28, **12**–166, 600] R. A. H.

**Champion (F. C.).** *Some physical properties of diamonds.* Phil. Mag. (Adv. in Physics), 1956, **5**, no. 20, 383–411.

The physical properties to be expected for a perfect pure diamond with the ideal atomic structure are contrasted with those actually observed with real diamonds of various types. In seeking possible explanations for the observed differences seven types of lattice defect are considered—dislocations and mosaicity, single vacant sites, aggregates of vacant sites, single interstitial carbon atoms, aggregates of interstitial carbon atoms, substitional foreign atoms, interstitial foreign atoms. A lengthy discussion leads to the conclusions that although 'solid state theory is capable of interpreting (the experimental facts) in a general way, many of the problems cannot yet be said to have been solved completely and unambiguously'; and that 'a rigorous quantitative comparison of theory and experiment has scarcely begun'. W. H. T.

**Wachtman (J. B., *Jr.*) & Maxwell (L. H.).** *Plastic deformation of ceramic-oxide single crystals, II.* Journ. Amer. Ceram. Soc., 1957, **40**, 377–385, 2 pls, 9 figs.

The investigation of synthetic sapphire single-crystal rods shows that the stress required to initiate creep smoothly from about 780 kg. per cm² at 900°C. to abou kg. per cm² at 1400°C. The addition of chromia incr the stress required to initiate creep. The creep constant load has periods of increasing rate, to decre rate, constant rate, and a final period of increasing creep Slip in sapphire takes place on the (0001) plane in the direction. Slip in periclase occurs on the (111), (110) (100) planes in the [1$\bar{1}$0] direction. Slip in rutile occu the (011) and (201) planes and possibly on the (001) Electrical resistivity of sapphire appears to increa plastic deformation and decrease by subsequent he near 1800°C. P. K.

**Bloss (F. Donald).** *Anistropy of fracture in quartz.* Journ. Sci., 1957, **255**, 214–225, 10 figs.

Specimens of 'rock crystal', rose quartz, and quartz were crushed both at room temperature a 650–700°C. mounted on a slide, and examined o universal-stage to determine for each fragment the between the optic axis and the normal to the plane o A definite crystallographic control of fracture is indic maxima at 52° are interpreted as the expressio cleavage parallel to the *r* and *z* rhombohedra of low c and to the corresponding unit dipyramid of high q lesser maxima at 90° indicate that prismatic cleav next in importance. Deformation lamellae, whic most frequently oriented sub-parallel to the basal pin are not considered likely to represent healed fra [M.M. **25**–259]. R. A.

**Bari (R. E.) & Derge (G.).** *Surface tensions of si* Journal of Metals, 1956, **8**, 1, 53–59, 3 tables, 4 fi

Six methods for measuring surface tension (or s energy) of liquid silicates are described. A comp and evaluation of the six methods is presented. Re ships between ionic potentials and surface tensio between types of chemical bonding and surface tensi discussed and tabulated. A literature review w references is included. R. G.

## ROCK-FORMING MINERALS AND PETROLOGY

**Marmo (V.) & Permingeat (F.).** *À propos des feldspaths potassiques du granite d'Azegour (Maroc).* Bull. Soc. franç. Min. Crist., 1957, **80**, 509–522, 6 figs.

The potassium feldspars of the Azegour granite are orthoclase partially transformed to microcline. The hypothesis that microcline may form directly in cases where the temperature is well beneath the microcline–orth inversion and where the accumulation of material wa enough for the establishment of the necessary con for a perfect arrangement of the Al-Si network, ponding to a minimum free energy, is discussed.

R. A.

**ik (G. F.).** *The mica-bearing pegmatites of the Harts Range, central Australia.* Econ. Geol., 1955, **50**, 625–649, 8 figs.

ıe composition of the mica-bearing pegmatites is ted to the nature of the metasomatic metamorphism of enclosing Pre-Cambrian gneiss. The main constituents quartz, perthitic microcline, plagioclase, and muscovite. ous types of perthitic intergrowths are reported and r origin is discussed. Analyses by Avery and Anderson given for perthite A from the intermediate zone of Dis- d pegmatite, Harts Range ; perthite B from the core Blackfellows Bones pegmatite ; perthite C from the rmediate zone of Last Chance pegmatite ; and musco- D from Caruso mine.

| $SiO_2$ | $Al_2O_3$ | $Fe_2O_3$ | FeO | MgO | CaO | $Na_2O$ |
|---|---|---|---|---|---|---|
| 63.27 | 19.10 | 0.96 | — | 0.16 | 0.22 | 1.64 |
| 64.13 | 19.00 | 0.40 | — | 0.08 | 0.31 | 1.58 |
| 63.85 | 19.37 | 0.25 | — | 0.04 | 0.25 | 1.54 |
| 46.10 | 34.28 | 0.51 | 1.57 | 1.25 | 0.18 | 0.19 |

| $K_2O$ | $H_2O+$ | $H_2O-$ | $TiO_2$ | BaO | Total | |
|---|---|---|---|---|---|---|
| 13.52 | 0.24 | 0.68 | 0.06 | tr. | 99.85 | |
| 13.92 | 0.20 | 0.04 | nil | 0.08 | 99.74 | In D, MnO tr., Li and |
| 13.82 | 0.26 | 0.08 | nil | 0.30 | 99.76 | F not detected. |
| 9.98 | 4.58 | 1.32 | 0.29 | — | 100.25 | |

R. A. H.

**ır (Knut).** *The formation of feldspar perthites in highly metamorphic gneisses.* Norsk Geol. Tidsskr., 1955, **35**, 87–91, 1 pl.

he development of perthite feldspars—so called meso- hites—in rocks shown to have crystallized in the nulite facies, is demonstrated by photomicrographs. It ncluded that in the area in question—the Ørsdalen area . Norway—the mesoperthite has been formed by partial acement of plagioclase by potash-feldspar, not by olution. I. W. O.

**stens (Harald).** *On the clouding of plagioclase in coronited meta-dolerites.* Norsk Geol. Tidsskr., 1955, **35**, 129–134, 3 pl.

he fine brown (or black) dust so commonly found in the ioclases of coronited meta-dolerites is due to exsolution on incorporated in the feldspar structure during crystal wth. The zoned distribution of the dust may be due to tive movement between crystal and magma, or to positional variation of the magma with time. The olution is probably a consequence of the coronition. ysynthetic twinning of the plagioclase developed at a r stage and was accompanied by rearrangement of the , as shown by differential clouding of the twin lamellae. I. W. O.

**Brown (D. A.).** *The geology of Siberia Hill and Mount Dasher, North Otago, with appendix by Coombs (D. S.). Notes on alkali feldspar, phillipsite and clinopyroxenes from Siberia Hill and Mount Dasher.* Trans. Roy. Soc. New Zealand, 1955, **83**, 347–372, 4 pls., 3 figs.

A Pliocene association of atlantites, feldspar-basalts, olivine nephelinites, sanidine basanites and zeolitic basanites is described, and an analysis is given of a zeolitic basanite. Large olivine nodules are plentiful. Groundmass alkali feldspar has $2V_a$ 40–60° ; variable refractive indices ($\alpha$ 1·525–1·536) and $d_{\bar{2}01}$ suggest ranges $Or_{45}An_4Ab_{51}$ to $Or_{30}An_{20}Ab_{50}$. Both analcime and phillipsite ($\alpha$ 1·492, $\gamma$ 1·496, $2V_\gamma$ 45–70°, $r > v$) appear to be primary constituents of the mesostasis of the zeolitic basanites. Phillipsite from an amygdale in sanidine has $\alpha$ 1·500, $\gamma$ 1·505. Zoned clinopyroxene has $\beta$ 1·710–1·723, $2V_\gamma$ 53–56°. D. S. C.

**Sahama (Th. G.).** *Complex nepheline–kalsilite phenocrysts in Kabfumu lava, Nyiragongo area, North Kivu in Belgian Congo.* Journ. Geol., Chicago, 1957, **65**, 515–526, 5 figs.

Phenocrysts consisting of an intergrowth of nepheline and kalsilite and surrounded by a homogeneous zone of nepheline have been studied by X-ray, optical, and d.t.a. methods. The cores of the crystals consist chiefly of an intergrowth of two nepheline phases and a disordered kalsilite phase : when heated at 860°±10°C. these form homogeneous tetrakalsilite crystals and on slow cooling in the laboratory these crystals unmix again. At a temperature of about 995°—1000°C. the tetrakalsilite phase inverts to a very potassium-rich nepheline of composition about $Ne_{28}Ks_{72}$. The composition of the rims of the phenocrysts is about $Ne_{60}Ks_{40}$ and it is concluded that these rims are precipitated after a sudden change in the composition of the magma. [M.M. **30**–439, **31**–200 ; M.A. **12**–372] W. S. M.

[**Lebedinsky (V. I.)** & **Chu Tzya-Syan**] Лебединский (В. И.) и Чу Цзя-Сянь. Об анортоклазе в щелочных базальтах южной окраины Монгольского плато (КНР). [*Anorthoclase from alkaline basalts of the southern border of the Mongolian plateau (CPR)*]. Зап. Всесоюз.Мин. Общ. [Mem. All-Union Min. Soc.], 1958, **87**, 14–22, 7 figs.

This is a chemical and optical study of several samples of soda-rich anorthoclase from basalt, spumulite (pumice), and lava breccia belonging to the Khanorb igneous complex of Oligocene age, from the neighbourhood of Kalgan, China. S. I. T.

**Harry (W. T.).** *The Old Red Sandstone lavas of the western Sidlaw Hills, Perthshire.* Geol. Mag., 1956, **93**, 43–56, 2 figs.

The re-mapping of about 23 square miles of Lower Old Red Sandstone 'porphyrites' and 'andesites' has revealed the presence of basalts, andesine-basalts, andesites, and (rare) trachyandesite, totalling almost 3,000 ft. in thickness and notably fresher than most Scottish lavas of similar age. A brief petrographic description of each lava-type and a consideration of plagioclase-augite textures are accompanied by seven new chemical analyses of lavas, two of which are from Fife. G. M. B.

**Rogers (John J. W.).** *Textural and spectrochemical studies of the White Tank quartz monzonite, California.* Bull. Geol. Soc. America, 1958, **69**, 449–463, 3 figs.

The lithologic variation over about 1000 feet vertically at the top of several intrusives of White Tank quartz-monzonite is described. Two sequences of differentiation were found : one sequence is marked by an increase in the size of potassium-feldspar crystals and an increase in the Ab/An ratio of the plagioclase from the older toward the younger rocks. The second sequence is marked by an increase in the Ab/An ratio of the plagioclase from the older toward the younger rocks and by the presence of primary muscovite and garnet in the younger rocks.

Determination of trace-element content were made on 24 K-feldspar samples. In the first differentiation sequence the amounts of lead and possibly strontium in the K-feldspar decrease from older to younger rocks, and the amounts of barium and rubidium remain constant. In the second sequence, the amounts of barium, lead, and strontium in the K-feldspar decrease during differentiation, and the amount of rubidium is constant. A. L. A.

**Shelton (John S.).** *Glendora volcanic rocks, Los Angeles basin, California.* Bull. Geol. Soc. America, 1955, **66**, 45–90.

The Glendora volcanic rocks of probably Miocene age consist of massive and autobrecciated basalt, calcic andesite, andesite, and rhyolitic lavas, and an approximately equal volume of interbedded tuffs and tuff breccias. Fourteen new chemical analyses of members of the volcanic series emphasize their andesitic character and notably low $K_2O$ and ferromagnesian constituents. Considerable volumes of andesitic tuff breccia containing numerous large blocks with what are interpreted as cooling cracks are believed to the deposits of several eruptions of nuée ardente type. R. A. H

**Schmidt (Robert George).** *Geology of Saipan, Mari Islands. Part 2B. Petrology of the volcanic ro* U.S. Geol. Survey, 1957, Prof. Paper **280**, 127– 14 figs., 6 pls.

The two principal types of Saipan volcanic rocks glassy dacites and comparatively crystalline andes The dacites consist mainly of silica-rich glass, oligoclase quartz, tridymite, cristobalite, chalcedony, and opal, minor hornblende, biotite, magnetite, and hematite. andesites are composed principally of labradorite, hy sthene, augite, and subcalcic augite, with minor qua tridymite, cristobalite, anorthoclase, magnetite, ilmen rutile, and apatite. Analyses are given for ten volc rocks from Saipan, five basalts from the islands of Alama Pagan, and Agrihan, and an andesite from Guam. Ch cally the Saipan volcanics are characterized by high Si Al and low K, Ti, and P : in the dacites normative qu may attain 49%, while the andesites are calcic with a l excess of lime over alkalies. If these rocks are relate ancestral basalts it may be necessary to assume assimila of important amounts of siliceous and aluminous cr material to account for their composition. The p genetical significance of the andesite line is consid [M.A. **5**–374]. R. A.

**Toulmin (P., *III*).** *Notes on a peralkaline granite Cashes Ledge, Gulf of Maine.* Amer. Min., 1957 912–915.

Quartz and microperthite, $Or_{56}(Ab+An)_{44}$, are app mately equal in amount. Hornblende, riebeckite, aegi ferrohortonolite ($Fa_{85}$), astrophyllite and aenigmatit comprise about 10% of the rock. Zircon and magn are accessory. G. D.

[**Kormilitzyn (V. S.)** & **Manuilova (M. M.)**] Кормили (В. С.) и Мануйлова (М. М.). Ритмично-полосч кварцевые порфиры горы Бугдан (юго-восто Забайкалье). [*Rhythmic-banded quartz porphyri mount Bugdaya (south-eastern Transbaikal reg* Зап. Всесоюз. Мин. Общ. [Mem. All-Union Min. 1957, **86**, 355–364, 6 figs.

A thick quartz-porphyry dike is described in which middle zone is made of drusy quartz interbanded

ophyre, a feature attributed to a rhythmic solidification ıe magma. S. I. T.

**or (G. G.)**] Моор (Г. Г.). Дифференцированные щелочные интрузии северной окраины Сибирской платформы (правобережье нижнего течения р. Котуя). [*Differentiated alkaline intrusions of the northern border of the Siberian platform (right bank of the lower Kotui River).*] Изв. Акад. Наук СССР, Сер. Геол. [Bull. Acad. Sci. URSS, Sér. Géol.], 1957, no. **8**, 40–52, 4 figs.

his newly discovered alkaline petrographical province ıorthern Siberia (100° E to 105° E, north of 68° N) ains a great variety of igneous rocks of Permian–ıssic age. The eruptive phases are: (1) lavas, tuffs, minor intrusions of nepheline basalt, nephelinite, itite, limburgite and alnöite, (2) lavas, tuffs, and minor usions of basalt, dolerite and small volumes of nepheline alt, (3) stock, and ring intrusions of alkali syenite, teigite–ijolite, melilite-peridotite, olivinite, and late ɔonate veins. Alnöite similar to kimberlite may also ɔng to this eruptive phase. It is suggested that kimberlite pipes of Vilui and Olekma may be gene-lly connected with this rock suite. S. I. T.

**utoyarsky (M. A.)**] Крутоярский (М. А.). О некоторых кимберлитовых телах бассейна р. Омоноос, Оленекского района. [*On certain kimberlite bodies in the basin of River Omonoös, Olenek region.*] Зап. Всесоюз. Мин. Общ. [Mem. All-Union Min. Soc.], 1958, ser. 2, **87**, 166–180, 10 figs.

Kimberlite pipes and dykes occur along a 500 km. long V. belt stretching from the headwaters of the River 'kh to the River Olenek in Siberia. The dominant rock is a-kimberlite similar to meimechite [M.A. **10**–83]. The erals and the inclusions of kimberlite are described chemical analyses of pyrope and of three kimberlites given. S. I. T.

**ryleva (N. A.)**] Курылева (Н. А.). К петрографии Сибирских кимберлитов. [*On the petrography of Siberian kimberlites.*] Зап. Всесоюз. Мин. Общ. [Mem. All-Union Min. Soc.], 1958, ser. 2, **87**, 233–237, 11 figs.

petrographical description is given of kimberlite from Siberian pipes. Inclusions of micaceous picrite ɔhyry, griquaite, eclogite, limestone and other rocks, as as olivine, pyrope and phlogopite, are described and a ıber of chemical analyses of kimberlites are given. S. I. T.

**Reed (J. J.).** *Spilites, serpentinites and associated rocks of the Mossburn district, Southland.* Trans. Roy. Soc. New Zealand, 1950, **78**, 106–126, 8 figs.

An account is given of spilites, albite-dolerites, keratophyres, and associated tuffs and sediments of late Palaeozoic age. Augite in a spilite has $\gamma : c$ 40°, $2V_\gamma$ 50°. Alteration products such as epidote, sericite, pumpellyite, and chlorite suggest regional metamorphism equivalent to the Chl. I subzone of the chlorite zone of Turner and of Hutton [e.g. M.A. **8**–19, **10**–432]. The petrography of the serpentinites is described in terms of chrysotile, antigorite, bastite, and serpophite. Prehnite occurs in veins in altered dolerites and gabbros. D. S. C.

**Reed (J. J.).** *Hornblende andesite rocks from Solander Island.* Trans. Roy. Soc. New Zealand, 1951, **79**, 119–125, 7 figs.

Describes with a chemical analysis hornblende-andesites from Solander Island, off the south coast of New Zealand. Hornblende of lamprobolite type has $\alpha$ 1·675, $\beta$ 1·693, $\gamma$ 1·709 ± 0·001; $\gamma : c$ 10°, $2V_\alpha$ 79°; $\alpha$ pale brown, light [*sic*], dark rusty brown. D. S. C.

**Mason (Brian).** *The syenite and associated rocks of the Mandamus-Pahau area, North Canterbury, New Zealand.* Trans. Roy. Soc. New Zealand, 1951, **79**, 260–275, 4 figs.

Analyses are given of syenite (containing aegirine and alkali- amphibole), sodalite-phonolite, olivine-gabbro (compared with kauaiite and Oslo essexite), trachyte (with alkali-amphibole), and the trachytic matrix of an igneous breccia. These rocks are probably of early Cretaceous age. D. S. C.

**Allen (L. R.).** *The Geology of Whangarei Heads, Northland.* Trans. Roy. Soc. New Zealand, 1951, **79**, 294–318, 6 plates.

Two early Tertiary limburgities are analysed, and andesities, dacites and a granodiorite-porphyry are reported. D. S. C.

**Protich (Mirko) & Soutchitch (Zora).** *Sur un nouveau type de lave néphélinitique dans les montagnes de Goloubac (Serbie orientale).* C.R. Acad. Sci. Paris, 1955, **241**, 428–429.

Mineralogical and chemical composition lead to the recognition of this lava as a plagioclase-étindite: anal.:

$SiO_2$ 38·02, $TiO_2$ 2·10, $Al_2O_3$ 17, $Fe_2O_3$ 8·01, FeO 4·23, MnO 1·10, MgO 8·02, CaO 11, $Na_2O$ 5·05, $K_2O$ 2·12, $H_2O$ ± 3·04, $P_2O_5$ tr., $Cr_2O_3$ 0·30, $SO_3$[no value], = 99·99.

E. J. & A. S.

**Jérémine (Élizabeth) & Sandréa (André).** *Sur la composition chimique d'espichellite et sa position dans la famille des lamprophyres.* C.R. Acad. Sci. Paris, 1955, **241**, 891–893.

Espichellite is a lamprophyre of essentially hornblendic and titaniferous character belonging to the family of melanocratic kersantites. Composition is $SiO_2$ 42·30, $TiO_2$ 3·50, $Al_2O_3$ 15·30, $Fe_2O_3$ 5·85, FeO 5·50, MnO 0·12, MgO 8·20, CaO 11·10, $Na_2O$ 2·00, $K_2O$ 2·50, $H_2O$ + 2·20, $H_2O$ — 0·90, $P_2O_5$ 0·53, $CO_2$ 0·75, = +100·75. [Biotite in reaction rims to titano-magnetite—Ed.] E. J. & A. S.

**Jérémine (Élizabeth).** *Nouvelles observations sur le granite de Rostrenen et ses contacts.* Bull. Serv. Carte géol. France, 1955, **53**, 243, 11–29.

The porphyritic granite of Rostrenen is bordered on the east side, rarely showing direct contact, by a rock of granite aspect, fine-grained, biotite-rich, which is situated on the horizon of the Gedinnian strata of the anticlinal fold of Forges de Rohan (near Plélauff). Geological and microscopical descriptions, diagrams, and photomicrographs tend to show that the mass of fine-grained granite is formed from a quartzite with phyllitic cement. The mass includes granite, granodiorite, monzonite poor in quartz, and biotite–augite gabbro free of quartz. Such a transformation of quartzite requires introduction and fixation of new elements. Four analyses: **A**, porphyritic granite of Rostrenen; **B** biotite-rich granodiorite of Plélauff; C, hornblende-monzonite of Locmaria; D, diorite-gabbro with biotite, augite, and amphibole of Quénécalec:

| | $SiO_2$ | $Al_2O_3$ | $Fe_2O_3$ | FeO | MgO | CaO | $Na_2O$ | $K_2O$ | $H_2O+$ |
|---|---|---|---|---|---|---|---|---|---|
| A | 64·55 | 16·15 | 2·61 | 3·50 | 1·90 | 3·10 | 1·65 | 3·35 | 0·95 |
| B | 59·30 | 17·50 | 0·49 | 5·36 | 4·19 | 5·06 | 2·81 | 3·18 | 0·61 |
| C | 56·00 | 17·00 | 2·75 | 5·30 | 3·60 | 6·90 | 2·65 | 3·50 | 0·50 |
| D | 54·65 | 14·40 | 3·24 | 5·55 | 5·40 | 6·75 | 3·15 | 3·05 | 0·35 |

| | $H_2O-$ | $TiO_2$ | $P_2O_5$ | $CO_2$ | MnO | F | S | Fe in FeS | Total |
|---|---|---|---|---|---|---|---|---|---|
| A | 0·15 | 0·69 | 0·31 | 0·10 | 0·05 | 0·10 | 0·13 | 0·10 | 99·46 |
| B | 0·17 | 1·24 | 0·29 | — | 0·05 | 0·23 | — | — | 100·48 |
| C | 0·50 | 1·35 | 0·33 | — | 0·27 | — | — | — | 100·65 |
| D | 0·26 | 1·10 | 0·61 | 0·29 | 0·14 | — | 0·20 | 0·17 | 99·31 |

A has also $ZrO_2$ trace, BaO 0·07. A. S.

**Bordet (Pierre).** *Phonolite à eudialyte du Jebel Fezzan.* Bull. Soc. franç. Min. Crist., 1955, **78**, 425–431.

Description of a nepheline-phonolite with eudialyte of Tertiary age; the eudialyte is slightly biaxial. T analyses of the same phonolite are given: A, by the Alg laboratory; B, by Patureau, Paris:

| | $SiO_2$ | $Al_2O_3$ | $Fe_2O_3$ | FeO | MgO | CaO | $Na_2O$ | $K_2O$ | H |
|---|---|---|---|---|---|---|---|---|---|
| A | 54·80 | 19·90 | 2·25 | 0·42 | 0·97 | 1·30 | 11·16 | 4·66 | |
| B | 55·00 | 21·25 | 3·20 | 0·50 | 0·30 | 0·66 | 9·80 | 5·50 | |

Totals 100·29, 100·83 include $TiO_2$ 0·28, 0·32; MnO 0 0·28; $P_2O_5$ 0·01, 0·05; $ZrO_2$ n.d., 0·50; $CO_2$ 0·34, S n.d., 0·10; $H_2O$— 0·08, 0·27 for A and B respectiv E. J. & A. S

**Koch (Pierre).** *Les pantellérites du Mont Mba Ns (Cameroun).* C.R. Acad. Sci. Paris, 1955, **241**, 893–8

The small massif of Mt. Mba Nsché to the south Mayo Darlé is composed of a riebeckite–aegirine–gran It belongs to the " Série Ultime " of Upper Pre-Camb age. To the east of it lies a small ridge of lavas at foot of which is found a pantellerite with aegirine, riebeck and cossyrite passing to a microgranite. Towards summit of the ridge a pantellerite with glassy base contai fine spherulites with radiating riebeckite. Anal. A, aegir pantellerite, B riebeckite–pantellerite.

| | $SiO_2$ | $Al_2O_3$ | $Fe_2O_3$ | FeO | MgO | CaO | $Na_2O$ | $K_2O$ | H |
|---|---|---|---|---|---|---|---|---|---|
| A | 62·20 | 12·10 | 6·95 | 3·90 | 0·25 | 0·93 | 4·10 | 6·30 | |
| B | 72·15 | 7·80 | 3·85 | 4·40 | 0·40 | 0·55 | 4·75 | 3·60 | |

Totals 99·46, 99·61 include $TiO_2$ 0·70, 0·40; MnO 0 0·22; $P_2O_5$ 0·11, tr.; $H_2O$– 0·70, 0·20; S in $SO_3$ –, 0·39 A and B respectively. E. J. & A. S

**Åhman (E.).** *De glasiga diabasgangarna i Djupv kalkbrott, Björkviks socken, Södermanland.* [*The gl dolerite dykes in the limestone quarry of Djupvik, pa of Björkvik, Södermanland*]. Sveriges Geol. Unders 1957, ser. C, **546**, 1–18, 7 figs.

The glassy dolerite contains microlites, plagioc (40–45% An) crystallites, and spherulites with kernels microlites or plagioclase crystallites. The central part the dykes are rich in nodules, filled with epimagm alteration minerals. The glass is black in the central p and brownish along the dyke borders; $n$=1·611 (= $SiO_2$). Chemical composition of glassy (A) and glass-bear crystalline (B) dolerite from Djupvik:

| | $SiO_2$ | $TiO_2$ | $Al_2O_3$ | $Fe_2O_3$ | FeO | MgO | CaO | $Na_2O$ | $K_2O$ | H |
|---|---|---|---|---|---|---|---|---|---|---|
| A | 47·42 | 3·02 | 16·73 | 1·98 | 10·90 | 4·36 | 6·28 | 2·43 | 2·45 | 1 |
| B | 49·96 | 3·61 | 15·70 | 1·02 | 11·15 | 3·30 | 6·94 | 3·09 | 1·83 | 2 |

and MnO 0·12, $H_2O$— 2·68, $CO_2$ 0·32, = 99·75 (A), and M 0·16, $H_2O$– 0·47, $P_2O_5$ 0·71, = 100·05 (B). The con between dolerite and limestone is very sharp and no con minerals have developed. The age of the dykes may

ld as Algonkian. The mode of crystallization is ssed, and a comparison is given with other Swedish Finnish occurrences. P. Lggn.

**rne (F. Fitz).** *La gabbroisation* [*Gabbroization*]. Ann. Assoc. Can.-Franç. Avancement Sci., 1952, **18**, section VI, 107–110.

me examples of late crystallization in basic rocks are for olivine, pyroxenes, amphiboles, and biotite. It is ated that these minerals, usually considered pyrogenic, form otherwise; "gabbroization" may be more non than is generally believed, because, for many rences, it is not possible to establish positively the of crystallization of the ferromagnesian minerals.

G. P.

**ıa (Georges).** *Essai d'une méthode graphique de calculs pétrochimiques.* Bull. Soc. géol. France, 1955, **5**, 243–247.

count of a simple geometrical method of presentation ıe results of chemical analysis of rocks and of the iples for its use in quick graphical calculation of ular petrochemical relations; with an example ed to the determination of the fundamental Niggli s. E. J. & A. S.

**(Jean).** *Le nouveau type de diagramme pour la représentation des caractères chimiques des associations régionales de laves.* C.R. Acad. Sci. Paris, 1955, **240**, 799–800.

graphical construction having $SiO_2$ as abscissa and the $CaO/(CaO+Na_2O+K_2O)$ as ordinate permits the sentation of each rock by one point and each associa- of rocks by a figure enclosing a group of points. This tends to simplify Peacock's representation [of rocks heir alkali–lime index: Journ. Geol., 1931, **39**–54]. E. J. & A. S.

**nulty (William N.).** *Geology of Cathedral Mountain quadrangle, Brewster County, Texas.* Bull. Geol. Soc. America, 1955, **66**, 531–578, 3 pls., 1 map.

rmian and Cretaceous sediments are overlain by ary volcanic rocks up to 4,600 feet thick. The nic succession comprises various basalt flows together tuff, andesite, and trachyte for which petrographic ls are given: the Crossen trachyte has vesicular zones amygdales of delicately coloured banded chalcedony, the basalts contain amethyst, semi-precious opal, ime, and stilbite. Some of the many intrusive bodies of alkalic microsyenite which are younger than the volcanic rocks have effected much local deformation of the layered rocks. The intrusions form dykes, sills, laccolithic bodies, and plugs: alkali feldspar forms 85—90 per cent. of the rock, the remainder including anorthoclase, aegirine-augite, and serpentine and iddingsite after olivine. In some specimens analcime, calcite, aenigmatite, riebeckite, and nosean(?) are found, the last as small isotropic six-sided crystals with refr. ind. 1·485–1·490. R. A. H.

**Wheeler (E. P., 2nd).** *Adamellite intrusive north of Davis Inlet, Labrador.* Bull. Geol.Soc. America, 1955, **66**, 1031–1060, 3 figs., 3 pls., 1 map.

An adamellite body of batholithic proportions cuts the basement complex of graphitic garnet gneisses, pyroxene gneisses and anorthosite. The adamellite can be subdivided into hypersthene, fayalite, hornblende, and biotite facies: hornblende adamellite makes up the bulk of the intrusive, the hypersthene facies being generally marginal or in dykes and of early formation, while the biotite facies is a late differentiate and in places is pegmatitic. The clino-pyroxene associated with hypersthene is ferrosalite, possibly grading to low-iron ferroaugite at the grain margins, while that associated with olivine ($Fa_{90}$) is hedenbergite, possibly grading to high-iron ferroaugite at the grain margins. In some rocks of the hypersthene facies two plagioclases have been distinguished, the more sodic being the antiperthite of the adamellite while the more calcic is interpreted as xenocrysts from the anorthosite. Contact metamorphism between the adamellite and the garnet gneiss has trans-formed the garnet into a myrmekite-like intergrowth of vermicular hypersthene in a cordierite mosaic. Many modal analyses and four chemical analyses are included.

R. A. H.

**Brown (G. M.).** *The layered ultrabasic rocks of Rhum, Inner Hebrides.* Phil. Trans. Roy. Soc. London, ser. B, 1956, **240**, 1–53, 5 pls., 9 figs., 9 tables.

Three sq. mls. of ultrabasic rock are mapped and described in detail. 2600 ft. of a rhythmically layered sequence is seen, divisible into fifteen major rhythmic units each grading from a peridotite below to allivalite above with sharp junctions with neighbouring units. Allivalite is re-defined as a dominantly olivine–plagioclase rock with olivine > plagioclase and the latter in the range $An_{80}$–$An_{100}$. Peridotite is defined as having plagioclase < olivine. Minor minerals are clinopyroxene and chrome-spinel. Each major unit contains fine-scale rhythmic banding. Analyses

with optical data are given for the olivine ($Fo_{86}$), plagioclase ($An_{84\cdot5}Ab_{15\cdot0}Or_{0\cdot5}$), and clinopyroxene ($Ca_{43\cdot9}Mg_{49\cdot2}Fe_{6\cdot9}$) from the same specimen. Analyses are given of six representative rocks and the composition of the parental magma is estimated to be tholeiite from a consideration of the composition of the interprecipitate liquid. Crystallization is discussed in terms of the Fo–Di–An system; the layering is interpreted in terms of crystal settling from a slowly cooling basalt magma. The absence of cryptic layering indicates a constant temperature of crystallization, the magma chamber being replenished by influx of further basaltic magma; the whole system lay beneath an active volcano. The ultrabasic mass reached its present level by ascent within a ring fracture. R. St J. L.

**Mathias (Morna).** *The petrology of the Messum igneous complex, South-west Africa.* Trans. Geol. Soc. South Africa, **59**, for 1956, 23–57, 1 fig., 4 pls.

The rock occurrences have been described by Korn and Martin [M.A. **13**–12] and petrographic descriptions are now given with 33 new analyses and records of minor constituents. They are grouped into volcanic, intrusive, and alkaline, the last being probably due to limestone syntexis. Metasomatism was facilitated by the presence of pyroclastics, while basalt and dolerite were particularly resistant. Photographs illustrate the sequence of crystallization in lava and tuff. E. D. M.

**Hunter (D. R.).** *The geology, petrology and classification of the Swaziland granites and gneisses.* Trans. Geol. Soc. South Africa, **60**, for 1957, 85–120, 7 pls., 9 figs.

The rocks described comprise infra-structural gneisses and granite and four other granites. Among the gneisses there occur granodiorite-gneiss, biotite-gneiss, granulites, quartzite, and quartz-schist together with amphibolite, talc-schist, serpentine, and pegmatite. The infrastructural granite is in part pegmatitic and in part migmatitic. The most widespread of the other granites is responsible for cassiterite, tantalite, columbite, gold, and baryte. All these granites are considered to belong to a single cycle of activity and show a progressive enrichment in potassium and a tendency towards porphyritic texture. 25 chemical analyses are given. E. D. M.

[**Borodin (L. S.**)] Бородин (Л. С.). О процессах нефелинизации и эгиринизации пироксенитов в связи с проблемой генезиса щелочных пород типа ийолитов-мельтейгитов. [*On the processes of nephelinization and aegirinization of pyroxenites in connection with the problem of genesis of alkaline zones of the ijolite-melteigite type.*] **Изв. Акад. Наук СССР, Сер. Г**. [Bull. Acad. Sci. URSS, Sér. Géol.], 1958, 48–57, 11 figs.

The study of certain alkaline intrusions in the U.S.S. leads the author to the conclusion that the associatio nepheline-rich and pyroxene-rich igneous zones is always due to the process of magmatic differentiation to the intrusion of an alkaline magma, followed by m somatism into pyroxenite or ultrabasic rocks. process may lead to the formation of the ijolite–melte series as distinct from the urtite–ijolite series. S. I.

[**Kononova (V. A.**).] Кононова (В. А.). О нефелинизации пироксенитов и мраморов. [*On the nephelinizatio pyroxenites and marbles.*] **Изв. Акад. Наук СС Сер. Геол.** [Bull. Acad. Sci. URSS, Sér. Geol.], **6**, 58–68, 9 figs.

This is a study of certain intrusive stocks of Tuv southern Siberia, supported by chemical analyses of p xenite, nephelinized pyroxenite, nepheline, and pyro It is concluded that melteigite is a product of nepheli tion of pyroxenite. Nephelinization of marble xeno is also observed. S. I.

[**Molchanova (T. V.**)] Молчанова (Т. В.). О гене щелочных пород интрузии Ирису (Таласский Ала [*On the genesis of alkaline rocks of the Irisu intr (Talass Alatau).*] **Изв. Акад. Наук СССР, Сер. Г** [Bull. Acad. Sci. URSS, Sér. Géol.], 1957, **7**, 8 4 figs.

A description is given of an igneous stock mad pyroxenite, shonkinite, and various types of syenites. intruded into limestone of Carboniferous age and fringed by a zone of marble, skarn and hornfels. author does not accept the explanation given by Nik of the origin of the neighbouring stock of Kaindy [ **7**–38], and postulates the formation of alkaline through the assimilation of limestones. S. I.

[**Vakhrushev (V. A.**)] Вахрушев (В. А.). О происхожд диоритовых порфиритов района Таштагол в Го Шории. [*On the origin of diorite porphyrites o Tashtagol region in Gornaya Shoria.*] **Изв. Акад.** СССР, Сер. Геол. [Bull. Acad. Sci. URSS, Sér. G 1957, **10**, 39–47, 7 figs.

It is suggested that hornblende-plagioclase-porph

n Tashtagol region in Western Siberia, found in the kimity of iron skarn, was produced by magmatic meta- atism of the adjoining limestone. S. I. T.

**)edev (A. P.)**] Лебедев (А. П.). Некоторые проблемы петрологии коренных алмазоносных пород в СССР. [*Certain problems of petrology of the primary diamond-bearing rocks in the USSR.*] Изв. Акад. Наук СССР, Сер. Геол. [Bull. Acad. Sci. URSS, Sér. Géol.], 1957, **11**, 50–57.

his is a general discussion of the nature and mode of nation of kimberlite pipes in Siberia and of their genetic tion to the " Siberian Traps ". S. I. T.

**rzhinsky (D. S.)**] Коржинский (Д. С.). Режим кислотности послемагматических растворов. [*Acidity regime of postmagmatic solutions.*] Изв. Акад. Наук СССР, Сер. Геол. [Bull. Acad. Sci. URSS, Sér. Géol.], 1957, **12**, 3–12.

t is calculated that the acidity of postmagmatic solution irst increases and then, after reaching a maximum, falls. h increase of acidity the ionization power of divalent d trivalent bases increases more rapidly than that of the valent bases. Thus one observes in basic and ultrabasic ks a postmagmatic pyrrhotine and titano-magnetite neralization, while in alkaline rocks the postmagmatic neralization is manifested in the formation of carbona- s. The values of relative mobilities for various ions are culated and the migration and combination of ions are cussed. S. I. T.

**kermann (Harry von).** *The alkaline and carbonatitic dikes of the Alnö formation on the mainland north-west of Alnö Island.* Kungl. Svenska Vetensk.-Akad. Handl., 1958, ser. 4, **7**, no. 2, 61 pp., 24 figs., 20 pls.

Through the building of a power station with several g tunnels at Bergeforsen about 6 km. north-west of the lö alkaline intrusion [M.A. **11**–27] a long radial profile ough cone sheets and radial dykes has been obtained. vious ideas on the location of the centre of intrusion are the main confirmed. A calculation of the amount of sing of the ground surface caused by the dykes is empted : the combined action of cone sheets and ring kes may have produced a minimum upheaval of 105 tres. The many dykes are briefly described and eighteen ich differ from those previously reported have been alysed and are described in detail. Four further analyses strate the weathering of the dykes. The depth of fenitization in relation to the thickness of the dykes is measured. The gneiss-granite was locally altered with the development of montmorillonite : analyses are also given for four such altered rocks. A concentration of the nepheline-bearing dyke rocks towards the upper fractional focus was established : the carbonatitic dykes were found to have preceded the contemporaneous kimberlitic ones. The origin of an alkaline magma of melilite-basaltic (alnöitic) chemical composition from which the different types of Alnö rocks were derived is suggested to be the basaltic layer of the earth's crust in conjunction with a so far unexplained local concentration of fugitive carbon [M.A. **13**–525]. R. A. H.

**Oftedahl (Christoffer).** *Studies on the igneous rock complex of the Oslo region. XV. Origin of composite dikes.* Skrift Videnskr.-Akad. Oslo, 1, Mat.-Nat. Kl., 1957, no. **3**, 17 pp., 5 figs.

Four composite dykes of the Oslo Region which have quartz porphyry cores and doleritic margins are believed to have formed from a granitic magma with a thin top layer of basic magma formed by liquefaction of a shaly roof rock. A similar origin is postulated for some syenitic dykes with basic borders : by analogy the close association of camptonite and maenaite (bostonite) dyke rocks in the Oslo area, is explained by assuming that basaltic magma transforms a thin zone of the roof of granodioritic gneisses into a soda-rich syenitic magma. The general idea of the formation of a secondary basic magma by the action of a granitic magma upon its basic roof is also offered as a solution to the lamprophyre problem. R. A. H.

**Brown (P. E.).** *The [eastern] Mourne Mountains granites—a further study.* Geol. Mag., 1956, **93**, 72–84, 1 fig.

New petrographic, chemical, and mineralogical data are given for the granites which form distinct intrusions, related through multiple cauldron subsidence, in this Tertiary volcanic centre in Northern Ireland. Nine new chemical analyses of rocks include granite-contacts and a related aplite in addition to the four main granite types (G1, G1′, G2, and G3). Analyses of a hornblende and a biotite have been made (rare from highly siliceous rocks) and both show a very high FeO:MgO ratio.

| | $SiO_2$ | $Al_2O_3$ | $Fe_2O_3$ | FeO | MgO | CaO | $Na_2O$ | $K_2O$ | $H_2O+$ |
|---|---|---|---|---|---|---|---|---|---|
| A | 38·77 | 10·08 | 4·07 | 26·54 | 2·53 | 9·65 | 1·61 | 1·18 | 1·85 |
| B | 35·40 | 11·82 | 9·52 | 25·09 | 0·95 | tr. | 1·54 | 9·02 | 3·64 |

Also A, $TiO_2$ 2·56, MnO 0·60, $H_2O-$ 0·06, = 99·50; B, $TiO_2$ 2·14, MnO 0·67, $H_2O-$ nil, = '99·86'.

A. Hornblende, G1 granite, α 1·696, γ 1·710, 2V 52°, α yellow-green, β olive-green, γ dark green, sp.gr. 3·41. B. Biotite, G2 granite, β 1·653, γ 1·653, 2V 0°, α pale yellow brown, β(= γ) dark brown. The alkali feldspars of G1 are briefly described, with reference to their variability in composition and degree of unmixing, the latter being related to distance from the contact. Evidence is given which supports the view that the granites were emplaced in a liquid condition. G. M. B.

**Buddington (A. F.), Fahey (J.), & Vlisidis (A.).** *Thermometric and petrogenetic significance of titaniferous magnetite.* Amer. Journ. Sci., 1955, **253**, 497–532.

Over 200 analyses have been used in a study of the variation in the titanium content of titaniferous magnetites from igneous and metamorphic rocks. In general the $TiO_2$ content of accessory magnetite of plutonic rocks is lower than that in volcanics of equivalent composition and when it exceeds *ca* 1% ilmenite is present in exsolved intergrowth. Although considerable variation occurs in the $TiO_2$ contents of magnetites from different representatives of a given igneous group there is a tendency for the magnetites of more siliceous rocks to be less titaniferous than those of basalts and andesites. Data for andesites show that in these rocks phenocrystal magnetite is less titaniferous than groundmass magnetite. $TiO_2$ contents for magnetites from metamorphic rocks tend to be lower than those of magnetites from all but the most siliceous igneous rocks. Schematic diagrams are presented to show variation in mineral assemblages in the system $Fe_2O_3$—FeO—$TiO_2$ with increasing intensity of oxidation. Two contrasted relationships for variation of $TiO_2$ content in magnetite with temperature are inferred. In one case $TiO_2$ increases with falling temperature and in the other it decreases. It is suggested that the former relationship arises through co-precipitation of ilmenite and titaniferous magnetite : the latter may have potentialities for relative geologic thermometry. The $TiO_2$ content of magnetites is used to show that titaniferous magnetite—ilmenite-rich concentrations in anorthosite may be largely magmatic, and that the magnetite in granophyre has a composit consistent with a magmatic origin of the host rock as ha those of a microperthite-granite from the Adironda and an alaskite. The hypothesis of immiscible segregat of ilmenite-ilmenomagnetite concentrations from anort sitic, mafic, or felsic magmas is briefly reviewed.

G. D. N

**Durand-Delga (Michel).** *Etude géologique de l'Ouest de Chaine Numidique (Algérie).* Bull. Serv. Carte g Algerie, 1955, **24**, 1–533, with several maps, sectio photographs, and photomicrographs.

Divided into four parts this work contains in chapt 2, 3 and 4 of the first part the detailed petrographi description of the crystalline series ; 26 chemical analyses

Chapter 2 gives a preliminary survey of the metamorp rocks of Petite Kabylic (SW sector), the largest Palaeoz amygdaloid of the mediterranean coast of La Berbé Seven sections show the order of superposition of the me morphic facies.

In chapters 3 and 4 are distinguished : I, the gneiss of fine grain, with plagioclase and 2 micas ; augen-gnei relics of sedimentary carbonate or detrital rocks and acid or basic eruptives ; gneiss with particular silica (sillimanite, cordierite) ; micacites ; granitoid rocks para or oblique to the foliation. II, micaschists with sometir tourmalinites at the base ; very thick epimetamorphic be rare detrital horizons ; very numerous and varied erupt rocks, quartzose (porphyroids, leptynites), basic, ul basic (serpentines), which form sills or lie obliquely to foliation.

Chapter 5 contains the general conclusions on the st of the metamorphic rocks : petrographical, stratigraphi and reconstruction of this original series before its tra formations. The metamorphism is of Caledonian age.

Chapter 15 deals with the post-Jurassic eruptive roc sills of " green beds " ; a variety of petrographic types fr andesites to pyroxenolites ; the microgranitic mass El-Milia ; age post-Burdigalian, pre-Pliocene ; petrogen discussion. E. J. & A. S

## TOPOGRAPHICAL MINERALOGY

**Kingsbury (Arthur W. G.) & Hartley (J.).** *Jarosite and natrojarosite from the Lake District.* Min. Mag., 1958, **31**, 813–815.

Jarosite as soft earthy aggregates or crusts of microscopic buff, golden-yellow, or brown crystals is recorded from various Cumberland localities at Carrock Fell, Caldbe Caldbeck Fells and Wanthwaite mine, St. John-in-the-V near Threlkeld. The Wanthwaite mine also yiel natrojarosite in golden-brown rhombohedral crys showing {0001}, {10$\bar{1}$1} and {01$\bar{1}$2}. R. A. H

**sbury (Arthur W. G.).** *Two beryllium minerals new to Britain: euclase and herderite.* Min. Mag., 1958, **31**, 315–817.

single bluish crystal of euclase with a distinct, longi- al, prismatic cleavage, was found in a quartz-vein Cligga Head [near Perranporth, Cornwall]. The rare um-beryllium phosphate herderite is recorded from material at Wheal Cock, St. Just, Cornwall, and from in course pegmatitic granite at Colcerrow Quarry, llyan, Cornwall, the material from both localities only with difficulty distinguished from apatite.

R. A. H.

**re (S.) & Kraut (M. F.).** *Sur les accidents sulfurés des schistes ardoisiers de l'Anjou.* Bull. Soc. franç. Min. Crist., 1957, **80**, 439–443, 3 figs.

e Ordovician schists and slates of Anjou contain a of sulphides including pyrite, pyrrhotine, chalcopyrite, erite, galena, and pentlandite. These minerals are l preferentially in the more calcareous horizons, e they often replace the calcium carbonate of fossils. considered that the sulphides were deposited in the of sedimentation at the same time as the other ituents of the schists rather than that they are the t of hydrothermal or metasomatic activity.

R. A. H.

**(Johannes A.).** *Coal blend and uraniferous hydrocarbon in Norway.* Norsk Geol. Tidsskr., 1956, **36**, 249–266, 6 figs.

al blende (an anthracite-like mineral) is now known to at 20 Norwegian localities, all situated in S.E. Norway d around the Oslo Region. These are listed and de- ed. Some new chemical analyses are given. The ocarbons are believed to be of Permian age and ected with the magmas of the Oslo Region.

I. W. O.

**iques (Å.).** *Swedish pyrophyllite deposits and the optical properties of pyrophyllite.* Arkiv Min. Geol. Stockholm, 1957, **2**, 279–282.

redish occurrences, all too small for mining, are ibed. Pyrophyllite from Västanå, parish Nasum, ty Kristianstad, gave $SiO_2$ 64·88, $Al_2O_3$ 28·64, $Fe_2O_3$ MnO 0·02, MgO 0·08, CaO 0·03, $Na_2O$ 0·03, $K_2O$ 0·04, + 5·47, $H_2O$— 0·09, $TiO_2$ 0·02, = 99·78 (anal. Aaremäe); $\alpha$ 1·556, $\beta$ 1·589, $\gamma$ 1·601 $\pm$ 0.002, –) 62°$\pm$1°, $\alpha : a$ 88·5°$\pm$0·5, $\beta : a$ 1·5°$\pm$0·5, $\gamma \parallel b$. Within experimental error 8 other samples gave the same values and the author doubts the existence of two pyrophyllite modifications with different optical properties [M.A. **11**–249]. K. F.

**Swift (W. H.).** *The geology of the Odzi gold belt.* Bull. Geol. Surv. Southern Rhodesia, 1956, no. **45**, 44 pp., 6 pls., 3 figs., 1 coloured map.

This belt is a westerly continuation of the Umtali gold belt [Bulletin 32] for about 44 miles and is about 3 miles wide. It possesses a synclinal structure and consists of ultrabasic rocks (serpentinite, tremolite-, anthophyllite-, and talc-schists) underlying sediments (banded ironstone, quartzite, marble, and arkose), all invaded by granite (granite, gneiss, pegmatite, aplite, greisen). Mica-schist and dolerite also occur. Descriptions are given of 75 gold mines and other mineral deposits mentioned are arsenic, beryllium, copper, lead, lithium, tin, tantalum-columbium, and tungsten. E. D. M.

**Wiles (J. W.).** *The geology of the eastern portion of the Hartley gold belt.* Bull. Geol. Surv. Southern Rhodesia, 1957, no. **44**, part 1, 103 pp., 6 pls., 6 figs., 1 coloured map.

The area is 1,000 sq. miles situated between 18°00′ and 18°30′ S and between 30°00′ and 30°30′ E. with the town of Hartley a little N.W. of the centre. The Great Dyke, about 6 miles wide, runs along the eastern margin, while a quarter of the area consists of a rough triangle of Basement schist, and the remainder of the area is Basement granite. The schists occur in series described as ultrabasic, greenstone, and sedimentary respectively and are followed by felsite and quartz porphyry intrusions and several types of granite which occupy just over half the total area. The Great Dyke occupies 182 sq. miles and consists of norite, pyroxenite, and harzburgite. The principal minerals are described and reference is made to igneous lamination, epidosite, granite dikes, prehnite, and the metamorphism of adjacent rocks and xenoliths. A subsidiary dike runs parallel to the Great Dyke 5 miles to the west, and dolerite sills also occur in the Great Dyke. E. D. M.

**Worst (B. G.).** *The geology of the country between Belingwe and West Nicholson.* Bull. Geol. Surv. Southern Rhodesia, **1956**, no. **43**, 218 pp., 25 pls., with coloured map.

The country represented covers 1568 sq. miles extending between 20°26′ and 21°00′ S. and between 29°30′ and

30°10′ E. Belingwe lies at about the mid-point of the northern boundary, and the southern end of the Great Dyke is shown near the centre of the map. The bulk of the area is granite with three distinct areas of Basement schist consisting of various series described as ultrabasic, greenstone, and sedimentary respectively. Minor instrusions are dolerite, amphibolite, pyroxenite, felsite, and porphyry. The Great Dyke is associated with parallel (Umvimeela) dikes and other satellites and a theory of their origin is offered. Magnetic traverses on serpentine and the Great Dyke are described. The occurrence of the following mineral deposits is described, chrysotile (13 properties), gold (191 properties), chromite (Great Dyke), copper, corundum, iron ore, lead, limestone, magnesite, muscovite, and scheelite (Great Dyke). E. D. M.

**Adie** (**R. J.**). *Geological investigations in the Falkland Islands Dependencies before 1940.* Polar Record, 1957, **8**, 502–513.

—— *Geological investigations in the Falkland Islands Dependencies since 1940.* Ibid., 1958, **9**, 3–17.

A review of the geological investigations which have been carried out in South Georgia, the South Sandwich Islands, the South Shetland Islands, Graham Land, and the South Orkney Islands, including 141 references. R. A. H.

**Benitez** (**Fernando**). *The iron mines of Chile.* Eng. and Mining Journ., New York, 1957, **158**, no. 7, 90–93. R. G. W.

**Tanton** (**T. L.**). *Orbicular jaspilite, Hull Township, Quebec.* Proc. Geol. Assoc. Canada, 1953, **6**, 75–82.

Jaspilite, ferruginous chert, and jasper common in the iron formations of the Canadian Shield, are described. The orbicular structure of jaspilite is compared to similar structures in granite and is believed to have developed under quiescent magmatic conditions during which separation of two immiscible fluids took place. The globules of the iron-rich dispersed phase grew by coalescence until they congealed to a silica-rich gel. Diffusion between matrix liquid and incipient orbules aided rhythmic precipitation of hematite in the gel. W. E. H.

**Carlson** (**H. D.**). *The origin of the corundum deposi Craigmont, Ontario.* Proc. Geol. Assoc. Canada, **6**, 19–27.

Corundum is irregularly distributed in a banded scapo andesine-nepheline gneiss complex and more abunda along the contact of this rock and younger hybrid alk syenites. The corundum in the complex resulted metasomatic replacement or magmatic assimilatio originally alumina-rich sediments. The alkaline sye developed by replacement of the scapolite-ande nepheline gneiss complex by which microcline devel at the expense of plagioclase, nepheline, and scap Alumina was released from the replaced rocks to recry lize as corundum. W. E.

**Tovell** (**W. M.**). *Geology of the Pembina Valley Deadl Creek area, Manitoba.* Manitoba Mines Branch Pr Rep., 1948, **47**–7, 7 pp., 2 maps.

Description of the stratigraphy of the Cretaceous ments in two river valleys in southern Manitoba. formations are shale interbedded with commercial swelling bentonite (montmorillonite) up to 15 feet t and with small amounts of melanterite and gyp (selenite). R. B.

**Cameron** (**E. L.**). *Salt, potash and phosphate in Mani* Manitoba Mines Branch Bull., **48**–9, 1949, 13 pp. 1

Brine springs of low concentration occur along the shore of Lake Winnipegosis. More concentrated deep containing mainly NaCl occur south of Lake Manit Phosphatic shale has been reported from the Wilson B valley in north-western Manitoba, and from the Pem River valley in southern Manitoba. Vivianite pos occurs at the second locality. R. B.

**Stanton** (**M. S.**). *Geology of the Dunphy Lakes Manitoba.* Manitoba Mines Branch Prelim. Rep. 1949, 34 pp. 1 map.

This area in north-western Manitoba is underlai a complex of Precambrian volcanic, sedimentary, m morphic, and intrusive rocks. Less common min noted are rose quartz and cordierite. R. B.

## VARIOUS TOPICS

**Roques** (**Maurice**). *Étude quantitative des myrmékites.* Sciences de la Terre, Univ. Nancy, 1955, no. hors série, 189–193.

Myrmekite is formed (generally at the contact of microcline and plagioclase) as the result of an essentially silic metasomatism, uhich fixes silica and frees alumina, and potassium.

E. J. & A.

**ıpson (C. Sheldon) & Wadsworth (Milton E.).** *Determination of the composition of plagioclase feldspars by neans of infrared spectroscopy.* Amer. Min., 1957, **42**, 334–341, 3 figs.

frared spectrometer patterns of eighteen plagioclase pars (four were chemically analysed specimens) show tematic change in wavelength of absorption bands with ical composition. A plot of chemical composition ıst wavelength for an absorption band between 15·4 16·2μ indicates structural changes in the plagioclase s in the ranges $An_{28}$–$An_{33}$ and $An_{67}$–$An_{85}$. Infrared ra do not appear to distinguish between high- and low-perature plagioclase feldspars. W. S. M.

**ıy (C.).** *Caractère particulier de la fluorescence des feldspaths dans certains granites des Vosges.* Bull. Soc. franç. Min. Crist., 1957, **80**, 546.

ıe soda-potash feldspars of certain granites and the oclase of a quartz-diorite in the Vosges show a berry-red fluorescence in ultra-violet light, while the pars of other granites nearby do not have this property. noted that the fluorescent feldspars generally have a ish colour, probably due to hematite. R. A. H.

**funin (A. S.)**] Марфунин (А. С.). Новая диаграмма оптической ориентировки кислых и средних плагиоклазов. [*A new diagram of optical orientation of acid and intermediate plagioclases.*] Доклады Акад. Наук СССР. [C. R. Acad. Sci. URSS], 1958, **118**, 1183–1186, 1 fig.

ne samples of acid-intermediate plagioclases, together data from the literature, provided material for the con-tion of a "divariant field" on the αβγ projection e for the whole series of "ordered" (low-temperature) "non-ordered" (high-temperature) plagioclases. This is made of intersecting "compositional" and "degree dering" isolines. S. I. T.

**danyantz (L. A.)**] Варданянц (Л. А.). Теория главного направления двойников и ее применение при исследовании плагиоклазов федоровским методом. [*The theory of the main direction in twins and its application to the study of plagioclases by the Fedorov method.*] Зап. Всесоюз. Мин. Общ. [Mem. All-Union Min. Soc.], 1957, **86**, 645–656, 3 figs.

was shown by E. S. Fedorov that in a twin of a ial crystal there is a direction along which the two twin individuals are optically indistinguishable; this direction Fedorov named "the main direction of a twin crystal". The present author develops mathematically this concept and shows its application to the determination of plagioclases. S. I. T.

[**Marfunin (A. S.)**] Марфунин (А. С.). Аналогия «высокотемпературной» и переходной оптики плагиоклазов с санидин-анортоклазовой оптикой калиевых полевых шпатов. [*The analogy of the "high temperature" and the transitional optics of plagioclases with the sanidine-anorthoclase optics of potash-feldspars.*] Изв. Акад. Наук СССР, Сер. Геол. [Bull. Acad. Sci. URSS, Sér. Géol.], 1957, **9**, 86–89, 2 figs.

Potash-feldspars and plagioclases from the Caucasian igneous zones were measured on the Fedorov stage with a view to determination of the orientation of the indicatrix, determination of 2V, and calculation of Köhler's angles. This allowed their classification into "high" and "intermediate" feldspars and their plot on two types of diagrams relating the temperature stage with composition. S. I. T.

**Perrault (Guy).** *La structure atomique des feldspaths.* L'Ingénieur, 1957, **43**, no. 172, 24–27, 6 figs.

A review of current research on the atomic structure of feldspar minerals. G. P.

**Walker (Theodore R.).** *Frosting of quartz grains by carbonate replacement.* Bull. Geol. Soc. America, 1957, **68**, 267–268, 1 pl.

Micro-etching on many peripherally replaced quartz grains produces a surface texture which appears frosted and which may be misinterpreted as resulting from aeolian abrasion. A particular case discussed concerns the nuclei of oolites which are well-rounded quartz grains with secondary quartz overgrowths : the silica of the overgrowth is more susceptible to replacement and the replacement by calcite or dolomite tends to halt at the grain boundaries, producing frosted relics with the rounded shapes of the original grains. R. A. H.

[**Umova (M. A.), Glebov (R. I.), & Shibanov (P. N.)**] Умова (М. А.), Глебов (Р. И.) и Шибанов (П. Н.). Исследование химического состава газообразных включений в кварце из различных месторождений. [*An investigation of the chemical composition of gaseous inclusions in quartz from different deposits.*]. Доклады Акад. Наук СССР [C. R. Acad. Sci. URSS], 1957, **112**, 519–521, 1 fig.

A specially constructed mill coupled to a vacuum installation was used for the extraction of gases from quartz. Twelve analyses given show a great variety in their composition. S. I. T.

[**Lemmlein** (**G. G.**)]. Леммлейн (Г. Г.). Образование жидких включений в минералах и их применение в геологической термометрии. [*The formation of liquid inclusions in minerals and their use in geological thermometry.*] Геохимия, Изд. Акад. Наук СССР [Geochemistry, Publ. Acad. Sci. USSR], 1956, **6**, 84–94, 10 figs.

This is a summary report of the author's work in this field, and it includes, besides problems of thermometry as such, an experimental study of the formation of inclusions in crystals, the healing of cracks in crystals, and the formation of secondary inclusions of mother liquor and the transformation and the breakdown of inclusions. S. I. T.

**Barrabe** (**L.**), **Collomb** (**P.**), & **Deicha** (**G.**). *Utilisation des sphères polies dans les recherches sur les reliquats magmatiques.* Bull. Soc. franç. Min. Crist., 1957, **80**, 450–452.

The technique developed by Heyart [Bull. Soc. franç. Min. Crist., 1955, **78**, lvii] using polished spheres, is recommended to petrographers studying under the microscope the temperatures at which cavities in minerals become filled by the liquid phase [M.A. **12**–497, **13**–604]. R. A. H.

[**Klevtzov** (**P. V.**) & **Lemmlein** (**G. G.**)]. Клевцов (П. В.) и Леммлейн (Г. Г.). Определение условий образования кварца с Ю. Урала по жидким включениям $CO_2$ и водного раствора солей. [*The determination of the conditions of formation of quartz from the southern Urals, according to the liquid inclusions of $CO_2$ and aqueous solution of salts.*] Зап. Всесоюз. Мин. Общ. [Mem. All-Union Min. Soc.], 1958, Sér. 2, **87**, 159–165, 4 figs.

According to the determinations by the authors, the inclusions in this particular quartz were formed at 470°–550°C and 2–2½ thousand atmospheres corresponding to a depth in the earth's crust of 8–10 km. S. I. T.

**Mason** (**Brian**). *Gonnardite* (*ranite*) *from Langesundsfjord.* Norsk Geol. Tidsskr., 1957, **37**, 435–437.

It is shown that ranite from Låven is identical with gonnardite [M.M. **31**, 265–271]. Even if the name ranite clearly has the priority (Paijkull, 1874), it now seems best to accept gonnardite as the name for this zeolite. I. W. O.

**Dutra** (**C. V.**). *Determinação espectroquímica de mai menores constituintes, em pequenas amostras de min Análise completa de lamprofilita e eudialita.* Inst de Pesquisas Radioativas, Univ. Minas Gerais, Horizonte, 1955, publ. no. **4**, 8 pp., 2 plates.

Spectrographic analyses gave: **A**, lamprophyllite Cascata, São Paulo, Brazil; **B**, eudialyte from the b of São Paulo and Minas Gerais.

| | $SiO_2$ | $TiO_2$ | $ZrO_2$ | $Al_2O_3$ | FeO | MnO | MgO | CaO | SrO |
|---|---|---|---|---|---|---|---|---|---|
| A | 26·50 | 29·20 | 0·15 | 0·80 | 1·80 | 5·87 | 0·50 | 1·90 | 19·80 |
| B | 50·0 | tr. | 10·4 | 0·2 | 4·0 | 4·0 | — | 10·5 | 4·2 |

A, also $H_2O$ 1·53, total 100·15. B, also F n.d., total 98·3.

L. J.

**Garavelli** (**Carlo**). *Ritrovamento di oxalite tra i mi secondari del giacimento di Capo Calamita.* Rend Min. Italia., 1955, **11**, 176–181.

Yellow to reddish-brown crystals of oxalite [= hum tine] in limonite from Elba (previously described b Manasse, 1910) have γ 1·695 and gave analysis $C_2O_3$ FeO 39·29, MgO 0·73, CaO 0·28, $H_2O$ 19·66, = 101·29, c ponding with $FeC_2O_4.2H_2O$, ferrous oxalate. X-ray p data are tabulated. [M.A. **13**–86.] L. J

**Garavelli** (**Carlo**). *Ricerche sulla 'mossottite' di Ge* (*Toscana*). Rend. Soc. Min. Ital., 1955, **11**, 182

Analyses of seven specimens of mossottite show 1·22–3·86%, and X-ray powder data agree with tho aragonite. L. J

**Grazzini** (**Maria**). *Sulla presenza della connellite prodotti delle fumarole vesuviane.* Rend. Soc. Ital., 1955, **11**, 220–225.

Minute crystals forming crusts have ω 1·733, ε [on another page 1·765, γ — α 0·022]. X-ray powder are compared with M.M. **29**–282. L. J

**Brito** (**Alberto Carlos de**). *Estudo espectrográfico de ele minimos em galenas portuguesas.* Estudos, No Trab., Serv. Fomento Mineiro, [1955], **10**, no 78–90, 1 map, 6 pl., 2 folded tables. (English sum p. 88.)

Qualitative and semi-quantitative determinatio 55 specimens from various localities. Ag, Al, As, C Fe, Mg, Sb, Si were found in all; in some B, Bi, C Mo, Ni, P, Sn, Ti, Zn, Ba, Be, Co, Ga. L. J

**Brito** (**Alberto Carlos de**). *Estudo espectrográfico de ele minimos em blendas portuguesas.* Estudos, No Trab., Serv. Fomento Mineiro, [1955], **10**, no 91–102, 1 map, 3 pl., 2 folded tables. (English sum p. 100.)

ualitative and semi-quantitative determinations on specimens from various localities. Ag, Al, As, Cd, Cu, In, Mg, Pb, Si were found in all; appreciable amounts Ge were found in 24 specimens; in some, variable ounts of B, Ba, Be, Bi, Ca, Co, Ga, Hg, Mo, Ni, Sb, Ti, V. L. J. S.

**ič (L. J.).** *Vivianit aus der Grube Stari Trg (Trepča) bei Kosovska Mitrovica.* Bull. Sci. Yougoslavie, 1955, **2**, 61.

Transparent emerald-green crystals up to 10 cm. long. ical data are given for four wave-lengths: for Na-light, ·5858, β 1·6030, γ 1·6354, $2V_\gamma$ 73° 21′, $r<v$. At 120°C er is lost and the colour is gold-brown. [M.A. **11**–506.] L. J. S.

**avelli (Carlo).** *Sulla presenza di paratacamite e di gesso cuprifero fra i minerali secondari del giacimento di Capo Calamita (Isola d'Elba).* Rend. Soc. Min. Ital., 1955, **11**, 147–175, 1 fig.

Analyses of green encrustations, after deducting gypsum, lachite, kaolinite, iron hydroxide, and quartz, give a mula $Cu_2(OH)_3Cl$; sp. gr. 3·745, ω 1·8418, ε 1·8484; a. curves and X-ray powder data are compared with se for atacamite. Green gypsum contains CuO 1·49%, l has sp. gr. 2·336, α 1·518, β 1·520, γ 1·527 (compared h colourless gypsum, sp. gr. 2·314, α 1·520, β 1·523, ·531). L. J. S.

**lerico (Marcella).** *Sulla breislakite.* Periodico Min. Roma, 1957, **26**, 191–210, 2 pls., 2 figs.

Breislakite (G. B. Broochi, 1817) from Vesuvius was first arded as a pyroxene, and later amphibole, fayalite, or il-te. Dark-brown, capillary material in lava from the Alban ls gave by spectrographic and micro-chemical analyses $O_3$ 13·13, $SiO_2$ 2·63, $Al_2O_3$ 2·27, $Fe_2O_3$ 50·17, FeO 22·28, O 1·44, MgO 3·22, CaO 1·23, $Na_2O$ 2·20, $K_2O$ 0·55, $H_2O$ 5, = 100·27, corresponding with $2(Fe,Mg)O_2Fe_2O_3.B_2O_3$. e X-ray powder pattern is similar to those of ludwigite l paigeite; the Laue pattern shows orthorhombic sym-try; Weissenberg patterns give $a$ 9·50, $b$ 12·40, $c$ 3·10Å, ce group $D_{2h}^9$, 2 mol., sp. gr. 4·57 (calc.), and a detailed ucture is worked out. L. J. S.

**avelli (Carlo).** *Ricerche su alcuni solfati del giacimento ferrifero di Terranera (Isola d'Elba).* Rend. Soc. Min. Ital., 1955, **11**, 100–146, 2 figs.

Chemical analyses, optical, dehydration, and X-ray data given for pickeringite, pisanite, botryogen, and copiapite rri-, magnesio-, and ferro-copiapites). L. J. S.

**Ljunggren (P.).** *Differential thermal analysis and X-ray examination of Fe and Mn bog ores.* Geol. Foren Förh. Stockholm, 1955, **77**, 135–147, 2 figs.

D.t.a. carried out on about 20 ferriferous bog ores from western Sweden revealed an endothermic reaction at much lower temp. than for both lepidocrocite and goethite, but X-ray analysis gave the pattern of goethite. This method of examination is not suitable for aged gels of iron oxides and oxide hydrates. D.t.a. of the Mn bog ores showed that they consist of hydrated compounds. X-ray analysis revealed the presence of δ-$MnO_2$ and of manganous manganite [Birnessite, p. 60] in one sample. E. Å-n.

**Dons (Johannes A.).** *Barite which decrepitates at room temperatures.* Norsk Geol. Tidsskr., 1956, **36**, 241–248, 4 figs.

Some white material from limestone nodules in Middle Ordovician shales found at Narum in the lake Mjosa district in S.E. Norway decrepitates violently when slightly heated, e.g. by holding it in the hand. The material consists of barite with gaseous (or liquid) inclusions. Heated to 30°–40°C in distilled water it decrepitates vigorously and at each click a bubble of gas, shown to include $CO_2$, rises. From the observed temperatures of decrepitation and on reasonable assumptions about the original pressure and about the composition of the material filling the cavities, it is concluded that this barite was probably formed at a very low temperature, tentatively below 45°C. I. W. O.

**Weiss (A.), Hartl (K.), & Hofmann (U.).** *Zur Kenntnis von Mono-hydrogen-uranylphosphat $HUO_2PO_4.4H_2O$ und Mono-hydrogen-uranylarsenat $HUO_2AsO_4.4H_2O$.* Zeits. Naturforsch., 1957, **12**b, 669–671.

The free acids of the uranite group minerals, $HUO_2PO_4{\cdot}4H_2O$ and $HUO_2AsO_4{\cdot}4H_2O$, were prepared by precipitation from solution. They are optically uniaxial plates of tetragonal symmetry with $a$ 6·90 ± 0·02, $c$ 17·12 ± 0·04Å, and $a$ 7·10 ± 0·02, $c$ 17·50 ± 0·04Å, respectively. Exchange of $H^+$ by $Ca^{2+}$ gives products identical with autunite and uranospinite. Other ions can also be introduced by exchange. $Cu^{2+}$ will not replace $H^+$, but will replace $Na^+$, $K^+$, $Mg^{2+}$, or $Ca^{2+}$ to give torbernite and zeunerite. Dehydration curves indicate $4H_2O$/formula wt. Suspensions of the $H^+$ forms are acid; solubility data given. It has not been possible to obtain $HUO_2VO_4.4H_2O$. [M.A. **11**–365, **12**–445]. R. C. M.

**Van Tassel (R.).** *On carphosiderite.* Min. Mag., 1958, **31**, 818–819.

On re-examination carphosiderite from Greenland [M.A. **7**–87, **13**–199] is shown to be natrojarosite. Its analysis gave $Fe_2O_3$ 42·7, $SO_3$ 27·3, $Al_2O_3+P_2O_5$ nil, CaO nil, MgO nil, $Na_2O$ 4·8, $K_2O$ (0·1), $H_2O+$ 12·1, $H_2O-$ 1·3, insol. 12·3, = 100·6, which on recalculation free of the insoluble material closely approximates to $NaFe_3(SO_4)_2(OH)_6$. [M.M. **31**–407 ; M.A. **13**–369, **14**–72] R. A. H.

**Hosking (K. F. G.).** *Identification of lithium minerals.* Min. Mag., 1957, **96**, 271–276.

The characteristics of the more important lithium-bearing minerals are noted and the flame test for Li is critically reviewed. Methods are given for identifying grains of amblygonite, spodumene, and petalite in composite samples and for the approximate determination of the amounts of these minerals which are present. [M.A. **14**–9] R. A. H.

**Nelson (D. F.).** *Brushite nodules and hydrogen swells in defective canned cheese paste.* Analyst, **83**, 539–540.

Nodules up to 5 mm. in diameter consisted of radial aggregates of microcrystals with $\alpha \approx 1{\cdot}539$, $\gamma \approx 1{\cdot}555$, whose X-ray powder pattern shows excellent agreement with that of brushite. R. A. H.

**Taylor (K.) & Harrison (R. K.).** *Coffinite in Cornwall.* Nature, London, 1958, **181**, 363, 1 fig.

The first record of coffinite in Britain, from Roskrow United Mine, Ponsanooth, Cornwall. Powder data, strongest lines : 3·49 (*vs*), 4·66 (*s*), 2·64 (*ms*) and 1·80 (*ms*)Å. P. A. S.

**Bariand (P.).** *Présence de bertrandite dans un sondage du gisement de Margnac IV. Commune de Compreignac, Haute-Vienne.* Bull. Soc. franç. Min. Crist., 1957, **80**, 547–548, 2 figs.

Bertrandite has been recognised in a bore-hole core from near Margnac, central France. It occurs as small colourless plates lining mineralized geodes, with green-blue to violet apatite, adularia, and smoky quartz. [M.A. **12**–363, 574] R. A. H.

**Fisher (D. Jerome).** *Alluaudites and varulites.* Amer. Min., 1957, **42**, 661–664.

These minerals are described chemically as phosphates of Na, Ca, $Fe^{II}$, $Fe^{III}$, and Mn, the ideal formula being taken as $W_{0\cdot12}(X+Y)_{12}(PO_4)_{12}$, where $W$ = Na, $X$ = $Mn^{II}$, $Fe^{II}$ ; and $Y$ = $Fe^{III}$. The varulites are h in Na and low in $Fe^{III}$ : most varulites and alluaudites much richer in Na than Ca. The dickinsonite miner invert to alluaudite on heating for a day in air at ab 500°C. The known minerals in the alluaudite group plotted on a triangular diagram, with isopleths for th indices, taking the end numbers as mangano-alluaud ferri-alluaudite and ferro-alluaudite. [M.A. **12**–400, **13**–2 R. A. H

**King (A. G.).** *Pyrite-uraninite polycrystal.* Amer. M 1957, **42**, 648–656, 6 figs.

A highly mineralized siliceous boulder from a stre bed in Colorado contains pyrite, uraninite, quartz, sphalerite(?) together with secondary uranium- and ot minerals. Most of the pyrite is unzoned, some sh single-phase zoning, while about 1 per cent. is two-pha zoned, in which pyrite and uraninite occur as thin altern layers parallel to the crystal faces of a pyrite nucleus. is believed that these represent an example of polycrys of uraninite and pyrite and that the mechanism formation is syntaxis. R. A. H

**Takéuchi (Tsunehiko) & Nambu (Matsuo).** *On neodige in Japan (Studies on the minerals of Cu–Fe–S se in Japan, first report).* Sci. Rep. Tohoku Un Third Ser. (Min., Petr., Econ. Geol.), 1957, **5**, 305–3 4 figs., 2 plates.

Neodigenite, $Cu_{1\cdot8}S$ [M.A. **9**–263], is recorded from se Japanese localities : it may be hypogene or superge associated with it are chalcocite, covelline, chalcopyr pyrite, pyrrhotine, magnetite, bornite, galena, sphale cuprite, enargite, tenorite, chrysocolla, and native cop In reflected light it is isotropic, less sensitive to $FeCl_3$ more bluish than chalcocite : neodigenite from Ojan mine, Yamagata Prefecture, had $a$ $5{\cdot}55_2$. [M.A. **7**– **10**–202]. R. A. H

**Lawrence (L. J.).** *Davidites from the Mt. Isa–Cloncu district, Queensland.* Econ. Geol., 1957, **52**, 140– 5 figs.

The uranium minerals davidite, brannerite, and ur ferous allanite occur in schists and granulites of Precambrian Argylla series. The davidites show a v variation in $U_3O_8$ content and are intimately intergr with ilmenite. Three varieties of davidite are recogn in hand specimen : a jet-black type, with a brill

ous lustre, and conchoidal fracture ; a steel-grey type, markedly irregular fracture ; and a dark grey to sh black, mottled type with intergrown hematite in ion to ilmenite. Chemical and spectrographic analyses iven for the three types together with X-ray powder action data. [M. M. **29**–209 ; M.A. **11**–436, 541]
R. A. H.

**son** (**Edward**) & **Hriskevich** (**M. E.**). *Cobalt-arsenic minerals associated with aplites at Cobalt, Ontario.* Econ. Geol., 1957, **52**, 60–75, 11 figs.

the Bass Lake area, near Cobalt, soda-aplites are d as narrow dykes in the Nipissing dolerite sill These es contain irregular replacement veins of metallic rals, which are also found with quartz and calcite in in the aplite ; the minerals recorded are pyrite, erudite, glaucodot, gersdorffite, rammelsbergite, opyrite, tennantite, niccolite, and bismuthinite. The es and associated metallic minerals are thought to be stage differentiates of the tholeiitic magma from which dolerite was formed. R. A. H.

**er** (**J. R.**). *Rare earths and thorium in lyndochite.* Amer. Min., 1957, **42**, 671–676.

ndochite from the type area [M.A. **3**–366] has been amined to ascertain the distribution of rare earths in nite and allied minerals. The percentage composition are earths separated from lyndochite, from Lyndoch, rew County, Ontario (and for those separated from erase-euxenite, Mattawan Township, Nipissing District, rio—given in brackets) calculated to 100% is $Y_2O_3$ (74·5), $La_2O_3$ 2·28 (< 0·1), $CeO_2$ 19·5 (0·49), $Pr_6O_{11}$ (< 0·5), $Nd_2O_3$ 25·0 (0·71), $Sm_2O_3$ 6·26 (0·69), $O_3$ 7·41 (2·57), $Tb_4O_7$ 0·66 (0·77), $Dy_2O_3$ 3·91 (4·90), $O_3$ 1·41 (5·28), $Tm_2O_3$ 0·62 (0·79), $Yb_2O_3$ 1·51 (8·38), $O_3$ 0·25 (0·92) : chemically lyndochite thus resembles nynite more than euxenite. In reflected light lyndochite le greyish white, isotropic. [M.A. **3**–261, **11**–304, **12**–345, 60] R. A. H.

**sig** (**Siegfried**) & **Allen** (**Robert D.**). *The hydration of kernite.* Amer. Min., 1957, **42**, 699–701.

w observations and a review of data in previous ture [M.A. **8**–115] lead to the conclusion that kernite $(B_4O_7.4H_2O)$ hydrates directly to borax $(B_4O_7.10H_2O)$ without going through the tincalconite $(B_4O_7.5H_2O)$ phase. [M.A. **4**–245, **6**–335] R. A. H.

**Klingsberg** (**Cyrus**) & **Roy** (**Rustum**). *Ramsdellite : newly observed in Minnesota.* Econ. Geol., 1957, **52**, 574–577.

Ramsdellite is recorded from the Monroe-Tener Mine, near Chisholm, Minnesota, where it occurs as shiny black radiating crystals in a matrix of goethite and pyrolusite. X-ray fluorescence analysis indicated that the heavy metal content of the ramsdellite is almost wholly manganese, with only a trace of iron. X-ray powder data are tabulated : the *a* and *b* cell dimensions are *a* $4{\cdot}518_4$, *b* $9{\cdot}269_6$ [M.A. **11**–238]. The geochemical significance of the occurrence together of the two polymorphs of $MnO_2$ is discussed. Groutite has been converted to ramsdellite in the laboratory. [M.A. **9**–4, 227, **12**–433] R. A. H.

[**Sumin** (**N. G.**)] Сумин (Н. Г.). О некоторых особенностях апатита скарновых железорудных месторождений. [*On certain features of apatite from skarn iron ore deposits.*] Труды Минер. Муз. Акад. Наук СССР [Trans. Min. Mus. Acad. Sci. USSR], 1957, **8**, 116–121, 2 figs.

Morphology, paragenesis, chemical composition and optical data of apatite from iron ore skarns are presented. Trace elements, as determined spectroscopically, suggest a genetic connection of this type of apatite with magmatic rocks. S. I. T.

[**Ginzburg** (**I. V.**)] Гинзбург (И. В.). О вариациях состава минералов в зоне контакта сподуменовых пегматитов и основных пород Кольского полуострова. [*On variations in the composition of minerals in the contact zone of spodumene pegmatites with basic rocks in Kola peninsula.*] Труды Минер. Муз. Акад. Наук СССР [Trans. Min. Mus. Acad. Sci. USSR], 1957, **8**, 61–76, 4 figs.

A detailed description of a large number of minerals from the contact zone of spodumene pegmatites is given. They include plagioclase, hornblende, clinozoisite, epidote, holmquistite, biotite, tourmaline, garnet (spessartine), apatite and muscovite. S. I. T.

[**Beus** (**A. A.**)] Беус (А. А.). О бериллиевом везувиане. [*On beryllium idocrase.*] Труды Минер. Муз. Акад. Наук СССР [Trans. Min. Mus. Acad. Sci. USSR], 1957, **8** 25–28, 1 fig.

A new analysis by A. M. Zasedatelev of beryllium idocrase from Central Kazakhstan is given : $SiO_2$ 39·10, BeO 0·77, $Al_2O_3$ 16·40, $Fe_2O_3$ 6·32, MgO 2·79, MnO 1·69,

CaO 32·29, F 1·24, total 100·60 $-F_2$ for O 0·52, = 100·08. It is suggested that in idocrase two parallel replacements may take place, Si by Be, and O by F. The formula of idocrase is $Ca_8(Al,Fe,Mg)_6[(Si,Be)_9(O,F,OH)_{34}]$. S. I. T.

**Baron (Guy), Caillère (Simonne), Lagrange (Raymonde), & Pobeguin (Thérèse).** *Sur la présence de huntite dans une grotte de l'Hérault (la Clamouse).* C.R. Acad. Sci. Paris, 1957, **245**, 92–94.

"Mountain-milk" from a cave in the Hérault region of France has been identified by its X-ray powder diagram as huntite [M.A. **12**–132]. An analysis gave $SiO_2$ 2·1, $Fe_2O_3$ 0·4, CaO 16·4, MgO 33·3, ign. loss 48·0, = 100·2. The d.t.a. curve has a strong endothermic peak at 480°C. and a weak one at 870°C. R. A. H.

**Hutton (C. Osborne).** *Kobeite from Paringa River, South Westland, New Zealand.* Amer. Min., 1957, **42**, 342–353, 2 figs.

Dark brown, prismatic crystals of a tantalum–niobium–titanium-bearing mineral have been found in a cobble of oligoclase-microcline graphic granite from gravels of the Paringa River. It is in the metamict state, with characteristic resinous lustre and conchoidal fracture; sp. gr. 5, refr. ind. 2·205, but after heating to 1200°C. this became 2·35. An X-ray diffraction study of the material before and after heat treatment suggests that the mineral is identical with or very closely related to kobeite from the Japanese type locality [M.A. **11**–518]. Qualitative chemical tests indicated the presence of Ta, Nb, Ti, and rare earths in considerable amounts, with Nb > Ta; Fe, Al, U, Th and $H_2O$ were also verified. Indexed X-ray powder patterns are given. R. A. H.

**Gaines (Richard V.).** *Luzonite, famatinite and some related minerals.* Amer. Min., 1957, **42**, 766–779, 6 figs.

A complete solid solution series exists between the tetragonal minerals luzonite, $Cu_3AsS_4$, and famatinite, $Cu_3SbS_4$. Luzonite is dimorphous with the orthorhombic mineral enargite, but the solubility of Sb in enargite is restricted and the orthorhombic dimorph of famatinite is not known in nature. The space group of luzonite–famatinite is $I\bar{4}2m$, $Z = 2$, and for synthetic materials the cell sizes for luzonite and famatinite respectively are $a$ 5·290, 5·38, $c$ 10·465, 10·78Å: some crystallographic measurements on natural crystals and indexed X-ray powder spacings on synthetic materials are listed. The crystal structure is of the sphalerite-type and is related that of chalcopyrite. Three new chemical analyses reported, together with physical and optical data. [M **1**–74, **4**–229, **7**–260, **10**–206] R. A. H

**Scott (Glenn R.).** *Genthelvite from Cookstove Mountain Paso County, Colorado.* Amer. Min., 1957, 425–429.

A well formed greyish-red to black crystal of genthel was found on a quartz–microcline–perthite–biotite in growth in a miarolitic cavity in pegmatite. The cryst a combination of the positive and negative tetrah further modified by the rhombic dodecahedron, c deltoid dodecahedron, and trigonal trisoctahedron. S chips are pale pink in transmitted light, the fractu uneven, the lustre vitreous, H. 6·5, $n = 1·745$. M chemical tests confirmed the presence of Zn, Be, an [M.A. **9**–62, **12**–343] R. A. H

**Ong (J. N.), Wadsworth (M. E.), & Fassell (W. M.).** *Ki study of the oxidation of sphalerite.* Journal of Me 1956, **8**, 257–263, 2 tables, 11 figs.

Sphalerite was found to oxidize linearly over the r of temperature 700° to 870°C., and of pressure 6 to 640 Hg. At higher rates considerable self-heating was obser The dependence of the oxidation rate on the ox concentration may be expressed by: $Rate = K'\theta$, w K′ is the specific rate constant, and $\theta = K_1[O_2]\ (1 + K_1[$ where $K_1$ is the equilibrium rate constant for the adsorp of oxygen on sphalerite. Values of the activation en and the enthalpy of adsorption were found to be 60·3 − 59·6 kcal per mol., respectively. R. G. V

**Jamieson (John C.).** *Introductory studies of high-pres polymorphism to 24,000 bars by X-ray diffraction some comments on calcite II.* Journ. Geol., 1957 334–343, 2 figs., 1 pl.

A technique is described by which X-ray diffrac studies may be made of substances at pressures in neighbourhood of 24,000 bars. A three-carat single cr of diamond is used as a pressure vessel. Aragonite vaterite showed no transition to 24,000 bars. A the dynamic argument shows calcite II and calcite III t unstable with respect to aragonite. X-ray powder pat of calcite II and thermodynamic evidence are consis with the interpretation that calcite II is an anion-disord form of normal calcite. [M.A. **2**–427, **7**–401, **12**–615, **13** R. A.

# ABBREVIATIONS AND SYMBOLS

**used in the text of abstracts**

M.M. .. Mineralogical Magazine : M.A. .. Mineralogical Abstracts : A.M. .. American Mineralogist

## CHEMICAL & PHYSICAL-CHEMICAL

| | |
|---|---|
| cation-exchange-capacity | c.e.c. |
| differential thermal analysis | d.t.a. |
| equivalent $U_3O_8$ | $eU_3O_8$ |
| ethylenediaminetetra-acetic acid | EDTA |
| heat of formation (absolute temperature subscript) | $\Delta H_t$ |
| ionic potential, e.g. | pH |
| insoluble residue | insol. res. |
| isotopes, e.g. | $^{40}A$, $^{40}K$ |
| loss on ignition | ign. loss |
| milliequivalent | me. |
| microgramme | µg. |
| million-years | m.y. |
| not determined | n.d. |
| not found | nt. fd. |
| not present | nil |
| parts per million | p.p.m. |
| strength of solution, normal | *N* |
| — — — molar | *M* |
| substances in ionic state | |
| anions, e.g. | $Cl^-$, $SO_4^{2-}$ |
| cations, e.g. | $K^+$, $Fe^{2+}$ |
| valency, e.g. | $Cl^I$, $Fe^{II}$, $Fe^{III}$ |

## CRYSTALLOGRAPHIC & STRUCTURAL

| | |
|---|---|
| Ångstrom unit ($10^{-8}$ cm) | Å |
| crystal axes | *a*, *b*, *c* |
| — face indices | (hkl) |
| — form indices | {hkl} |
| — zone indices | [hkl] |
| indices of X-ray diffractions | hkl |
| intensity, | *I* |
| — relative | $I/I_0$ |
| interplanar spacing | *d* |
| mica structural polymorphs | $1M_1$, $2M_1$ |
| Siegbahn units | kX |
| space group. These words will be written in full | |
| unit cell, formula units | *Z* |
| — — repeat distances | *a*, *b*, *c* |
| — — reciprocal lattice lengths of edges | $a^*$, $b^*$, $c^*$ |
| — — interaxial angles direct lattice | $\alpha$, $\beta$, $\gamma$ |
| — — — — reciprocal lattice | $\alpha^*$, $\beta^*$, $\gamma^*$ |

## OPTICAL

| | |
|---|---|
| dispersion, e.g. | $r > v$ |
| extinction angle, e.g. | $\gamma : c$ |
| optic axial angle | 2V |
| — — plane | O.A.P. |
| refractive index, in text | refr. ind. |
| — — of isotropic mineral | *n* |
| refractive indices | |
| of uniaxial mineral | $\omega$, $\varepsilon$ |
| of biaxial mineral | $\alpha$, $\beta$, $\gamma$ |
| sign of biaxiality | |
| negative | — or $2V_\alpha$ |
| positive | + or $2V_\gamma$ |

## PHYSICAL (*other*)

| | |
|---|---|
| calorie | cal. |
| calorie, large | kcal. |
| cycles per second | c/s |
| degree centigrade | °C |
| density | *D* (quote units) |
| — , relative, e.g. | $D_4^{20}$ |
| gramme | g. |
| hardness | H. |
| melting-point | m.p. |
| micron ($10^{-4}$ cm) | µ |
| millimicron ($10^{-7}$ cm) | mµ |
| pounds per square inch | lb/in² |
| soluble | sol. |
| specific gravity, terms of reference not known | sp. gr. |
| wavelength | λ |

## SYMBOLS

| | |
|---|---|
| approximately equal to | ≈ |
| equal to | = |
| equal to or greater than | ⩾ |
| equal to or less than | ⩽ |
| greater than | > |
| less than | < |
| not equal to | ≠ |
| parallel to | ∥ |
| per cent. | % |
| per mille | ‰ |
| perpendicular to | ⊥ |
| proportional to | ∝ |

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